

DOCUMENT SUBMISSION STATUS: FF

NOTE:

0	24 Feb. 2016	For Approval	S.J.HEO	S.J.KANG	G.Y.OH	S.H.YANG
REV.	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED	APPROVED

OWNER  VIETNAM OIL AND GAS GROUP (PVN)	OWNER'S CONSULTANT <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  FICHTNER GmbH & Co. KG </div> <div style="text-align: center;">  PVPOWER PCC </div> </div>
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EPC CONTRACTOR  PETROVIETNAM CONSTRUCTION JOINT STOCK CORPORATION (PVC)	EPC CONSTRUCTOR'S CONSULTANT  WORLEYPARSONS
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POWER ISLAND PACKAGE SUPPLIER  SOJITZ CORPORATION	 DAELIM INDUSTRIAL CO., LTD.
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PROJECT TITLE <p style="text-align: center;">THAI BINH 2 THERMAL POWER PLANT 2 x 600MW</p>

DRAWING / DOCUMENT TITLE <p style="text-align: center;">SCR OF SOOT BLOWER SPECIFICATION</p>

Vendor's Logo: 	FUNCTION	NAME	SIGN	DATE
	DRWN	J.LEE		14 May. 2015
	CHKD	G.Y.OH		14 May. 2015
	APPD	H.S.LEE		14 May. 2015
DOCUMENT NO: TB2-SDC.VP124-00HTA-M-M1A-SPC-0003	No of page: 143		Scale	Rev.0

P.O NO.	110180-29-124-001-A01
ITEM NO.	124
ITEM DESCRIPTION	De-Nox System
DOCUMENT NO.	TB2-SDC.VP124-00HTA-M-M1A-SPC-0003
DOCUMENT TITLE	SCR OF SOOT BLOWER SPECIFICATION
REV NO.	0

Daelim's Approval Status

Daelim Industrial Co., Ltd.	
Job No.	110180
	A - APPROVED
	B - APPROVED WITH COMMENTS
	C - RETURNED FOR CORRECTION
	D - REJECTED
	N - NOT APPLICABLE(REFERENCE ONLY)
SIGNED BY :	DATE :
<p>DIC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.</p>	

VENDOR'S LOGO:



Document Review Comment Sheet

Daelim's Ref. No. :

No.	Document No.	Rev	Title	Purpose	Approval Status
1	TB2-SDC.VP 124-00HTA-M-M I A-SPC-0003	E	SCR of soot blower specilication	AP	B
No.	Daelim's Comments		Vendor's Response		
1	Please reflect the design of receiver tank according to owner's comment will be provided later. DIC cannot approve this document without owner's final approval.		Confirm.		

* Legend

Purpose:

AP - For Approval
RE - For Reference
FF - For Final / FC - For Construction
F - Final / AB - As Built
INFO - For Information

Approval Status:

A - Approved
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N - Reference Only

I n d e x

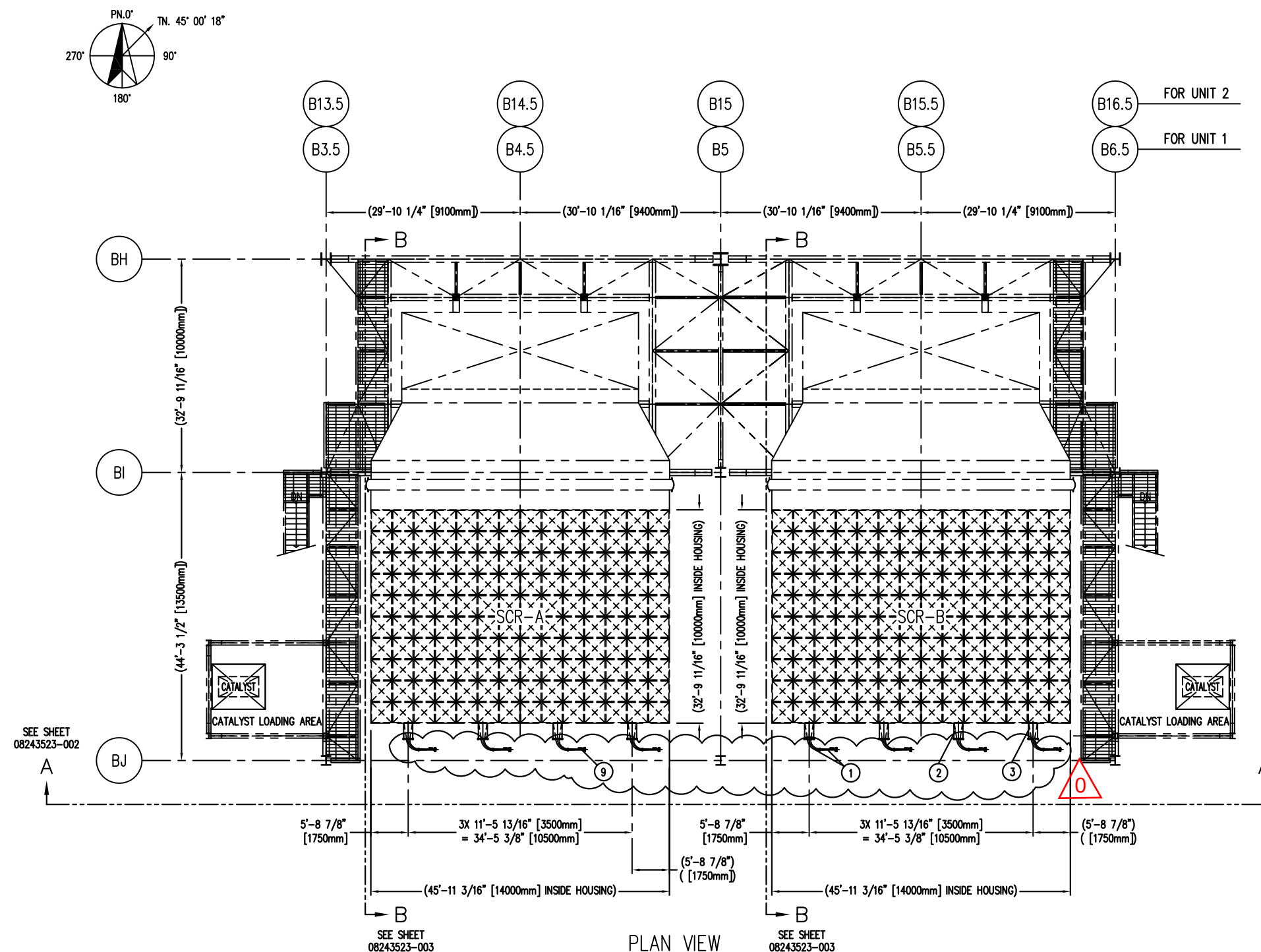
- 1. Soot Blower(Acoustic Horn)GA DWG**
- 2. Sonic Horn**
- 3. Air Filter**
- 4. Air Regulator**
- 5. Air Dryer**
- 6. Air Receiver Tank**
- 7. Solenoid Valve**
- 8. Ball Valve**
- 9. Wave Detector Sensor**
- 10.Control Panel**
- 11.Mounting Tube**

Soot Blower(Acoustic Horn)GA DWG

COMPR. AIR REQUIREMENTS		28~38 L/S @ 5~6barg	GAS TEMPERATURE	N/A
APPLICATION		SCR	OEM	N/A
QTY.	ITEM NO.	PART NO.	DESCRIPTION	
48	1	08230439	ACOUSTIC HORN, DC-75-1-2-1, DRIVER: ASTM A36 PLATED, A-BELL: CAST IRON, B-BELL: CAST STEEL	
48	2		C-BELL: 304 STN. STL. SHT., 12 GA.	
48	3		MOUNTING TUBE AND FLANGE: ASTM A36 STEEL	
48	4		FLEX HOSE, 3/4 in. 1265mm BRAIDED 304 STN. STL.	
48	5		SOLENOID VALVE, 20A. NPT, WITH JUNCTION BOX, 220V/50Hz, BRASS	
48	6		BALL VALVE, 20A IN:NPT OUT:SW, A105	
12	7		AIR REGULATOR, 40A ANSI 150# RF	
2	8		AIR FILTER, 50A ANSI 150# RF	
48	9		WAVE DETECTOR SENSOR 220V/50Hz	

* - QUANTITIES ARE FOR TWO (2) UNITS. ONE (1) UNIT SHOWN.

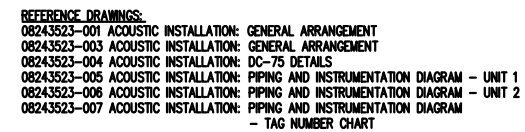
REFERENCE DRAWINGS:
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 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-2: GENERAL ARRANGEMENT
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-3: DC-75 DETAILS
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-4: PIPING AND INSTRUMENTATION DIAGRAM - UNIT 1
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-5: PIPING AND INSTRUMENTATION DIAGRAM - TAG NUMBER CHART



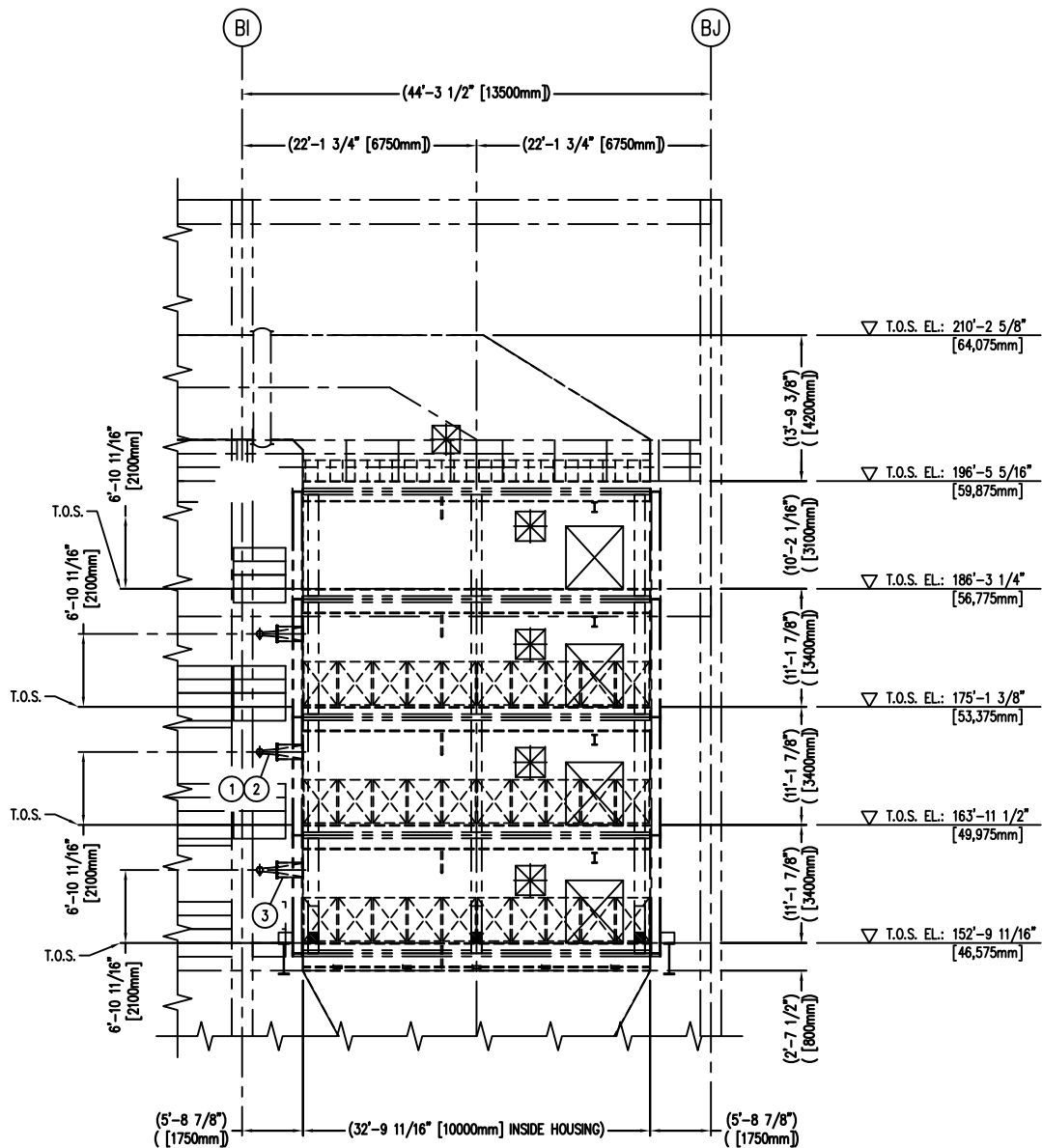
DOCUMENT SUBMISSION STATUS:								
NOTE:								
	14 Jan.2015	FOR CONSTRUCTION			J.LEE	G.Y.OH	C.Y.YANG	H.S.L
REV	DATE	DESCRIPTION			PREP	CHKD	APRD	APP
OWNER				OWNER'S CONSULTANT				
 VIETNAM OIL AND GAS GROUP (VNG)				 FICHTNER GmbH & Co. KG FICHTNER PV POWER PC				
EPC CONTRACTOR				EPC CONTRACTOR'S CONSULTANT				
 PETROVIETNAM CONSTRUCTION JOINT STOCK CORPORATION (PVC)				 WorleyParsons (resources + energy) WORLEYPARSONS				
POWER ISLAND PACKAGE SUPPLIER								
 SOJITZ CORPORATION				 DAELIM INDUSTRIAL CO., LTD.				
PROJECT TITLE								
THAI BINH2 THERMAL POWER PLANT 2 x 600MW								
DRAWING TITLE								
ACOUSTIC INSTALLTION GENERAL ARRANGEMENT								
VENDOR NAME				FUNCTION	NAME	SIGN	DATE	
 S&T CORPORATION				DRWN	J.LEE			
				CHKD	G.Y.OH			
				APPD	C.Y.YANG			
				APPD	H.S.LEE			
DRAWING NO. TB2-SDC.VP124-00HTA-M-WIA-SPC-003-1				JOB NO. 110180	SCALE 1/1	REVNO		
				FILE NAME : TB2-B-CO-000-MMN-P01				

Daelim Industrial Co., Ltd.	
Job No.	110180
	A - APPROVED
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[illegible]

COMPR. AIR REQUIREMENTS	28~38 L/S @ 5~6barg	GAS TEMPERATURE	N/A
APPLICATION	SCR	OEM	N/A



VIEW B-B: ELEVATION VIEW

ACOUSTIC HORN SOUNDING SEQUENCE:

FOR STARTUP HORN GROUPS TO SOUND FOR 10 SECOND ONTIME ON A 10 MINUTE CYCLE. THIS ONTIME/OFFTIME TO BE ADJUSTED TO CLEAN THE CATALYSTS MORE OR CLEAN THE CATALYSTS LESS AS DEEMED NECESSARY IN FIELD TRIALS. CYCLES MAY NEED TO BE ADJUSTED BASED ON EQUIPMENT LOADING AND OPERATIONAL NEEDS.

OFFTIME REFERS TO DWELL TIME BETWEEN HORN GROUPS. THE FOLLOWING IS THE STARTUP HORN SOUNDING SEQUENCE:

SCR 1A, ACOUSTIC HORNS 15HST10AN011, 12 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 1B, ACOUSTIC HORNS 15HST20AN011, 12 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 1A, ACOUSTIC HORNS 15HST10AN013, 14 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 1B, ACOUSTIC HORNS 15HST20AN013, 14 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 1A, ACOUSTIC HORNS 15HST10AN015, 16 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 1B, ACOUSTIC HORNS 15HST20AN015, 16 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 1A, ACOUSTIC HORNS 15HST10AN017, 18 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 1B, ACOUSTIC HORNS 15HST20AN017, 18 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 1A, ACOUSTIC HORNS 15HST10AN019, 20 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 1B, ACOUSTIC HORNS 15HST20AN019, 20 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 1A, ACOUSTIC HORNS 15HST10AN021, 22 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 1B, ACOUSTIC HORNS 15HST20AN021, 22 10 SECONDS ONTIME 40 SECONDS OFFTIME.

ACOUSTIC HORN SOUNDING SEQUENCE:

FOR STARTUP HORN GROUPS TO SOUND FOR 10 SECOND ONTIME ON A 10 MINUTE CYCLE. THIS ONTIME/OFFTIME TO BE ADJUSTED TO CLEAN THE CATALYSTS MORE OR CLEAN THE CATALYSTS LESS AS DEEMED NECESSARY IN FIELD TRIALS. CYCLES MAY NEED TO BE ADJUSTED BASED ON EQUIPMENT LOADING AND OPERATIONAL NEEDS.

OFFTIME REFERS TO DWELL TIME BETWEEN HORN GROUPS. THE FOLLOWING IS THE STARTUP HORN SOUNDING SEQUENCE:

SCR 2A, ACOUSTIC HORNS 25HST10AN011, 12 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 2B, ACOUSTIC HORNS 25HST20AN011, 12 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 2A, ACOUSTIC HORNS 25HST10AN013, 14 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 2B, ACOUSTIC HORNS 25HST20AN013, 14 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 2A, ACOUSTIC HORNS 25HST10AN015, 16 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 2B, ACOUSTIC HORNS 25HST20AN015, 16 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 2A, ACOUSTIC HORNS 25HST10AN017, 18 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 2B, ACOUSTIC HORNS 25HST20AN017, 18 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 2A, ACOUSTIC HORNS 25HST10AN019, 20 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 2B, ACOUSTIC HORNS 25HST20AN019, 20 10 SECONDS ONTIME 40 SECONDS OFFTIME.
SCR 2A, ACOUSTIC HORNS 25HST10AN021, 22 10 SECONDS ONTIME 40 SECONDS OFFTIME.	SCR 2B, ACOUSTIC HORNS 25HST20AN021, 22 10 SECONDS ONTIME 40 SECONDS OFFTIME.

REFERENCE DRAWINGS:

TB2-SDC.VP124-00HTA-M-M1A-SPC-003-1: GENERAL ARRANGEMENT
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-2: GENERAL ARRANGEMENT
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-4: DC-75 DETAILS
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-5: PIPING AND INSTRUMENTATION DIAGRAM - UNIT 1
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-7: PIPING AND INSTRUMENTATION DIAGRAM - TAG NUMBER CHART



DOCUMENT SUBMISSION STATUS:

NOTE:

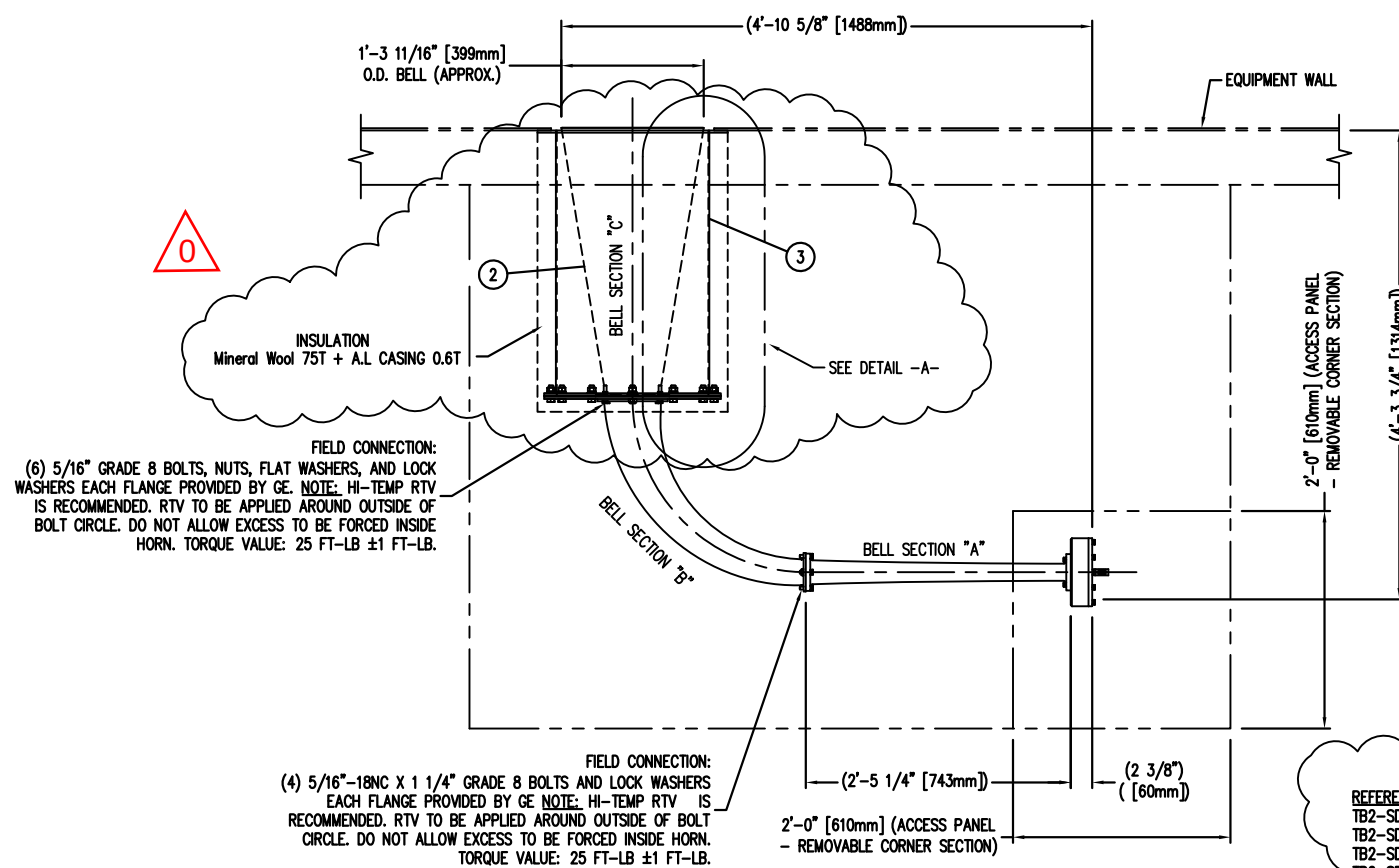
REV	DATE	DESCRIPTION	PREP	CHKD	APRD	APRD
1	14 Jun.2015	FOR CONSTRUCTION	JLEE	G.Y.OH	C.Y.YANG	H.S.LEE

OWNER	VIETNAM OIL AND GAS GROUP (P.W.)	OWNER'S CONSULTANT	FICHTNER GmbH & Co. KG	PV POWER PCC
EPC CONTRACTOR	PTC PETROVIETNAM CONSTRUCTION JOINT STOCK CORPORATION (PVC)	EPC CONTRACTOR'S CONSULTANT	WorleyParsons	WORLEYPARSONS
POWER ISLAND PACKAGE SUPPLIER	SOJITZ CORPORATION		DAELIM INDUSTRIAL CO., LTD.	

PROJECT TITLE					
THAI BINH2 THERMAL POWER PLANT 2 x 600MW					
DRAWING TITLE					
ACOUSTIC INSTALLTIO GENERAL ARRANGEMENT					
VENDOR NAME		FUNCTION	NAME	SIGN	DATE
 S&T CORPORATION		DRWN	J.LEE		
		CHKD	G.Y.OH		
		APPD	C.Y.YANG		
		APPD	H.S.LEE		
		DRAWING NO.		JOB NO.	SCALE
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-3		110180	1/1	①	
10		11		FILE NAME : TB2-B-CC-000-UNN-F00	

Daelim Industrial Co., Ltd.	
job No.	110180
	A – APPROVED
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COMPR. AIR REQUIREMENTS	28~38 L/S @ 5~6barg	GAS TEMPERATURE	N/A
APPLICATION	SCR	OEM	N/A

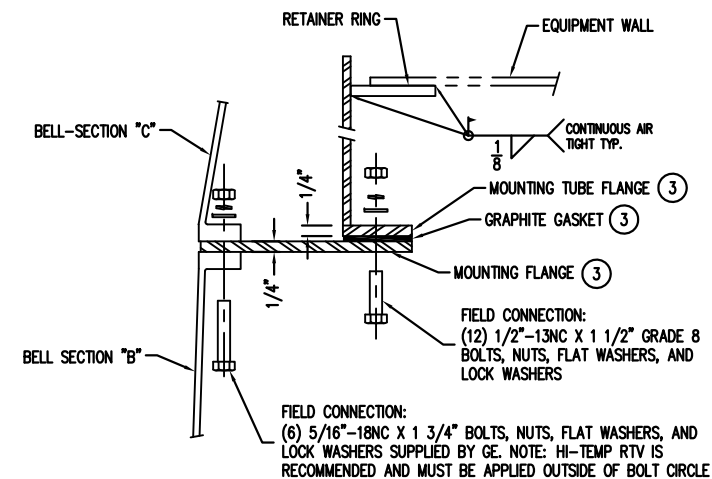


PLAN VIEW

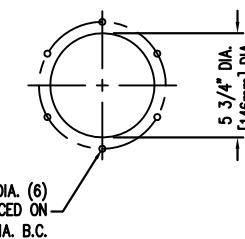
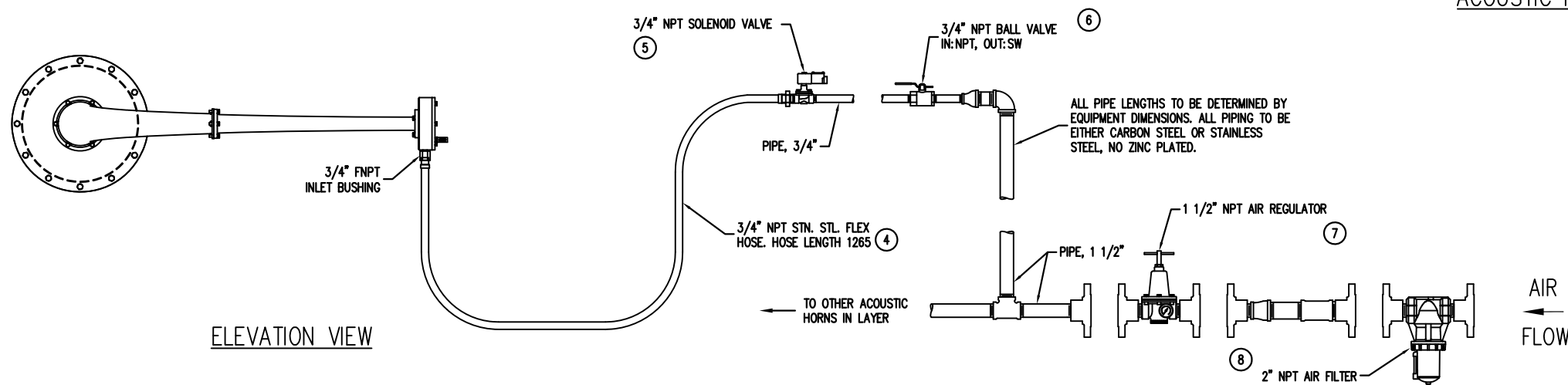
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TB2-SDC.VP124-00HTA-M-M1A-SPC-003-1: GENERAL ARRANGEMENT
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TB2-SDC.VP124-00HTA-M-M1A-SPC-003-3: GENERAL ARRANGEMENT
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-5: PIPING AND INSTRUMENTATION DIAGRAM - UNIT 1
TB2-SDC.VP124-00HTA-M-M1A-SPC-003-7: PIPING AND INSTRUMENTATION DIAGRAM - TAG NUMBER CHART

PLUMBING GENERAL ARRANGEMENT

NOTE: THIS IS A PICTORIAL VIEW OF SINGLE HORN PIPING, USE FOR REFERENCE ONLY.
REFER TO SCHEMATIC DETAIL FOR MORE SPECIFIC INFORMATION.



DETAIL -A-

BOLT HOLE PATTERN BETWEEN
ACOUSTIC HORN SECTIONS B AND C

ELEVATION VIEW

DOCUMENT SUBMISSION STATUS:

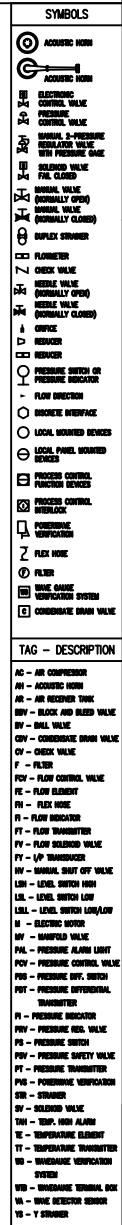
NOTE:

REV	DATE	DESCRIPTION	PREP	CHKD	APRD	APRD
1	14 Jun.2015	FOR CONSTRUCTION	J.LEE	G.Y.OH	C.Y.YANG	H.S.LEE

OWNER	VIETNAM OIL AND GAS GROUP (P.V.N)	OWNER'S CONSULTANT	FICHTNER GmbH & Co. KG FICHTNER PV POWER PCC
EPC CONTRACTOR	PETROWETNAM CONSTRUCTION JOINT STOCK CORPORATION (PVC)	EPC CONTRACTOR'S CONSULTANT	WorleyParsons WORLEYPARSONS
POWER ISLAND PACKAGE SUPPLIER	SOJITZ CORPORATION		DAELIM INDUSTRIAL CO., LTD.

PROJECT TITLE		THAI BINH2 THERMAL POWER PLANT 2 x 600MW			
DRAWING TITLE		ACOUSTIC INSTALLTION DC-75 DETAILS			
VENDOR NAME		FUNCTION	NAME	SIGN	DATE
 S&T CORPORATION		DRWN	J.LEE	<i>[Signature]</i>	
		CHKD	G.Y.OH		
		APPD	C.Y.YANG	<i>[Signature]</i>	
		APPD	H.S.LEE	<i>[Signature]</i>	
DRAWING NO. TB2-SDC.VP124-00HTA-M-M1A-SPC-003-4		JOB NO.	110180	SCALE 1/1	REV.NO. 1

Job No.	110180
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DOCUMENT SUBMISSION STATUS:

NOTE:

		14 Jan.2015			FOR CONSTRUCTION		J.LEE	G.Y.OH	C.Y.TANG	H.S.LEE
REV	DATE	DESCRIPTION				PREP	CHKD	APRD	APRD	
OWNER					OWNER'S CONSULTANT					
<div> PETROVIETNAM VIETNAM OIL AND GAS GROUP (PVM)</div>					<div> FICHTNER GmbH & Co. KG FICHTNER PV POWER PCC</div>					
EPC CONTRACTOR					EPC CONTRACTOR'S CONSULTANT					
<div> PETROVIETNAM PETROVIETNAM CONSTRUCTION JOINT STOCK CORPORATION (PVC)</div>					<div> WorleyParsons resources • energy WORLEYPARSONS</div>					
POWER ISLAND PACKAGE SUPPLIER										
<div> SOJITZ CORPORATION</div>					<div> DAELIM INDUSTRIAL CO., LTD.</div>					
PROJECT TITLE										
THAI BINH2 THERMAL POWER PLANT 2 x 600MW										
DRAWING TITLE										
ACOUSTIC INSTALLTION P&ID										
VENDOR NAME					FUNCTION	NAME	SIGN	DATE		
					DRAWN	J.LEE				
					CHKD	G.Y.OH				
					APPD	C.Y.TANG				
					APPD	H.S.LEE				
<div> S & T CORPORATION</div>					JOB NO.	110180	SCALE	1/1	REV.NO.	
					DRAWING NO. TB2-SOC.VP124-00HTA-M-M1A-SPC-003-5					

10

11

FILE NAME : TB2-B-00-000-1000-1000-F001

Doellm Industrial Co., Ltd.	
Job No.	110180
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VENDOR NAME

S&T

S&T CORPORATION

DRAWING NO. TB2-SDC.VP124-00HTA-M-M1A-SPC-003-6		JOB NO. 110180	SCALE 1/1	REV.NO.
10	11	FILE NAME ; TB2-B-CC-000-MMM-FXXX		

A

UNIT-2

	FROM BOM -002		
TAG NUMBER	QTY.	ITEM #	DESCRIPTION
25HST10AN011 THRU 25HST10AN022, 25HST20AN011 THRU 25HST20AN022	24	1	ACOUSTIC HORN, DC-75-1-2-1, DRIVER: ASTM A36 PLATED, A-BELL: CAST IRON, B-BELL: CAST STEEL
		2	C-BELL: 304 STN. STL. SHT., 12 GA.
FV25HST10AA401 THRU FV25HST10AA412, FV25HST20AA401 THRU FV25HST20AA412,	24	5	SOLENOID VALVE, 3/4 in. NPT, WITH JUNCTION BOX. 230V/50Hz, BRASS
25HST10AA509 THRU 25HST10AA520, 25HST10AA522 THRU 25HST10AA533,	24	6	BALL VALVE, 3/4 IN.:SW OUT:NPT, A105
PRV25HST10AA101, PRV25HST20AA101	2	7	AIR REGULATOR, 40A ANSI 150# RF
F-1	1	8	AIR FILTER, 50A ANSI 150# RF
VA25HST10AN011 THRU VA25HST10AN022, VA25HST20AN011 THRU VA25HST20AN022	24	9	WAVE DETECTOR SENSOR 220V/50Hz

F

	9
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REFERENCE DRAWINGS:
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-1: GENERAL ARRANGEMENT
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-2: GENERAL ARRANGEMENT
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-3 : GENERAL ARRANGEMENT
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-4 : DC-75 DETAILS
 TB2-SDC.VP124-00HTA-M-M1A-SPC-003-5 : PIPING AND INSTRUMENTATION DIAGRAM - UNIT 1

Sonic Horn

DATA SHEET

DC-75

POWERWAVE® ACOUSTIC HORNS



MODEL DC-75

The model DC-75 Powerwave® Acoustic Horn produces 147dB at one meter with a fundamental frequency of 75 Hz.

PRINCIPLE OF OPERATION

The DC-75 produces a low frequency, high pressure sound wave. The sound wave is produced when compressed air forces the titanium diaphragm to flex, which in turn causes a pressure pulse to be emitted from the horn's bell. This causes particulate deposits to resonate and dislodge from the surfaces to which they have bonded. The deposits are then removed by gravity or gas stream pressure. For more information on BHA's complete line of high performance acoustic products, call your BHA representative toll-free at 800-821-2222.

APPLICATION

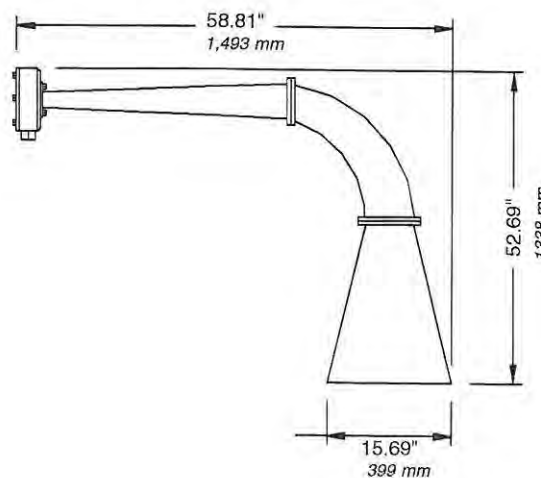
BENEFITS

Spray Dryer	- Prevents build-up on vertical surfaces - Increases up-time
Boiler/Economizer/Air Heater/SCR	- Prevents deposit build-up on heat transfer surfaces - Eliminate steam sootblowers

SPECIFICATIONS:

Fundamental Frequency (Hertz).....	75 Hz
Output Power Level (Decibels).....	147 dB
Material . Cast iron/cast carbon steel/stainless steel	
Diaphragm Material	Gr. 4 Titanium
Max Operating Temp.	1600° F (870° C)
Weight.....	130 lbs. (58.97 kg)
Air Consumption.....	60-80 SCFM @ 70-90 PSI (28-38 l/s @ 5-6 bar)

**Note: For higher temperatures or corrosion resistance, horns can be manufactured from various alloys.





Operation and Maintenance Manual
for SCR Applications:

Powerwave® Acoustic Systems – Models DC-75 & D-75 75 Hz Acoustic Cleaners



For support
(+1) 800.821.2222
www.ge-energy.com/airquality

8800 E. 63rd St.
Kansas City, MO 64133
USA



K6MK1624-SCR
P/N 0100-1160
Rev. A

Table of Contents

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Troubleshooting	19

Operation and Maintenance of Acoustic Cleaners

Operational Philosophy of Acoustic Cleaners

The Powerwave acoustic cleaners are designed to be operated in a very aggressive manner to produce proactive cleaning in order to provide efficient operation and effective gas to catalyst contact throughout the operation of the unit. Acoustic cleaning does not allow particulate to accumulate or settle on the catalyst like other intermittent cleaning methods.

The high-energy sound waves emitted from the acoustic cleaners act to resonate and dislodge ash particulate and prevent buildup on the catalyst and other surfaces within the SCR reactor prior to coherent attachment to the surfaces. This ash particulate is then swept from the surfaces and carried through the system by gas flow and gravity.

Powerwave Model D-75 Acoustic Cleaners generate low frequency (75 Hz) and high energy (147 dB) sound to provide the acoustic energy required to clean the full width of the SCR.

The horns are installed between the SCR catalyst layers, spaced evenly as possible across one wall of each reactor.

The Model DC-75 is the curved equivalent to the Model D-75 that offers versatility in the installation and is usually selected to reduce walkway congestion or avoid other obstructions.

Recommended Acoustic Cleaner Operation

The acoustic cleaning system for each layer of catalyst will require 75 Hz. horns spaced every 9 to 12 feet. Horn locations may vary slightly to avoid structural members and other obstructions. **Refer to the SCR installation arrangement drawings provided with every system for the specific dimensional information of your system.**

The recommended cleaning sequence (subject to field change or adjustment) is to alternately sound adjacently positioned or opposing acoustic cleaners at a set time interval. Each horn or set of horns should sound for 10 seconds every 10 minutes. The control and sequencing of the horns can be provided by a specially programmed controller or may reside in an existing DCS.

Horn Sounding, Grouping, and Sequence:

For startup, horn groups are to sound for a 10-second on time on a 10-minute cycle. This ontime/offtime can be adjusted to clean the heat transfer surfaces more or less often as deemed necessary in field trials. Cycles may need to be adjusted based on equipment loading and operational needs.

Each horn or group of horns, sound for 10 seconds in each 10-minute cycle. Off time between groups should be divided evenly over the total 10 minute (600 second) cycle, so that each set of horns is sounded once every ten minutes.

Compressed Air Consumption

The instantaneous air consumption for each acoustic cleaner is a maximum of 80scfm @ 90 PSI. Assuming the horns were operated at the highest recommended pressure, each horn would consume only 80 scfm if operated continuously. Since the horns are operated for a 10-second duration, each horn will consume approximately 13 cubic feet of air during a cleaning cycle. When two horns are operated at one time, the

instantaneous airflow requirement will be slightly below 160 scfm (while the horns are in operation). If three horns are operated at one time the airflow requirement will be somewhat below 240 scfm (while the horns are in operation). Actual air usage will depend on the operating sequence that is being used and the draw down in the sound generator inlet air pressure when adjacent horns are sounded simultaneously. The minimum acceptable local air pressure as measured at the branch line pressure gauge to each group of horns is 70 PSI. During the initial commissioning of the horns the actual decrease in local pressure should be observed and recorded for future use to diagnose a significantly worn or damaged sound generator. A worn or damaged sound generator would result in a significantly higher draw down of pressure (due to higher air consumption) and should be repaired or replaced. (See Driver Inspection Procedure section of this manual.)

Operator Interface

It is very difficult to determine that a horn is functioning at its rated sound pressure level using the human ear. However, significant mal-performance can be detected as described herein. The solenoid valves provided with the acoustic cleaning system are equipped with a manual override feature. This manual override can be used to operate a horn without the need for an electrical signal. This is especially useful when troubleshooting the cleaning system and for regularly scheduled operating verification. It is recommended that once a week an operator manually sound each horn to verify its proper operation. When listening to the operation of the horns from outside of the SCR reactor, the operator should expect to hear a low tone similar to the sound of a foghorn or a tuba. It is also very likely that the operator will feel the "resonation" of the sound waves as the horn is operated. This can be checked by holding a hand on the sound generator of the acoustic cleaner or on the heavily insulated SCR reactor wall. These two indicators should be used to confirm that a horn is operating. Any discernable difference between two or more horns should be investigated following the procedures in the troubleshooting section of this manual.

The existence of a high pitch sound (i.e. squealing or screeching) would also be an indication that the horn is not operating correctly. There are a number of factors that could cause a horn not to operate correctly, refer to the troubleshooting section of this manual for specific potential problems and their solutions.

The acoustic driver (or sound generator) can be inspected or maintained while the boiler unit is online if necessary. Be sure to lock out the compressed air supply to the driver prior to removing the cover plate. Follow the procedures in the Driver Inspection Procedure section of this manual when inspecting or maintaining the driver. If there is concern that the boiler unit could produce a positive pressure, then purge air should be applied to the bell section using the 1/4" NPT fitting. This will prevent the back flow of hot gas while the driver assembly is open.

Regular System Checks

A major part of your acoustic cleaning system is the compressed air system. Refer to the installation drawings included with this manual for a specific list of items included with the system. Air line accessories (valves, regulators, filters, etc.) should be checked periodically for proper operation.

At each catalyst level for each reactor the 1 1/2" branch compressed air line is fitted with a regulator to control the operating pressure. Plant personnel, to assure that there is adequate line pressure for the acoustic horns to operate correctly, should check the pressure gauges regularly (once a week). These gauges should be showing compressed air pressure between 70 PSI and 90 PSI while the acoustic horns are in operation. The operator is reminded that a low-pressure condition observed could be a compressor or supply side problem only if the low pressure consistently results when each group of horns sounds. In the case of a specific horn or group of horns giving a low-pressure measurement the likely hood of a specific horn sound generator fault is raised. Refer to "Compressed Air Consumption" paragraph for supplementary information on this matter.

Removal or Replacement of the Horn Assembly

Removal or replacement of the entire horn assembly while the unit is online is not recommended. Removal and replacement of the horn assembly when the unit is offline should follow these procedures:

1. Lock out the compressed air supply to the horn.
2. Disconnect the stainless steel flex hose from the drive assembly
3. Remove the bolts that attach the mounting flange to the mounting ring.
4. Slide the horn assembly out of the mounting ring. Be careful not to drop the horn assembly as this could cause significant damage to the castings.
5. Reverse this procedure to reinstall the horn.

Safety Considerations

IMPORTANT SAFETY NOTICE

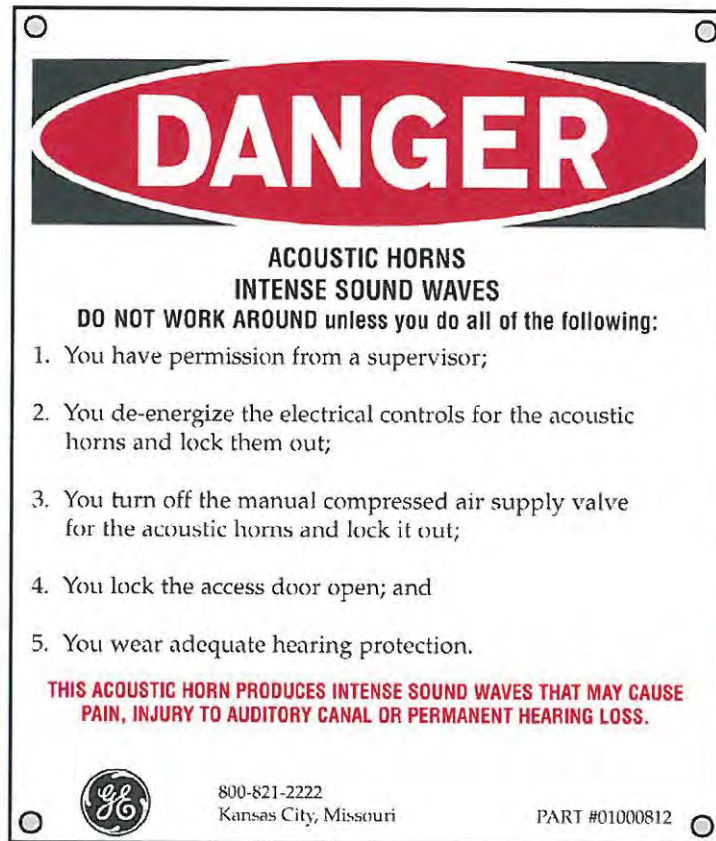
The safety precautions set forth below must be followed when working around or using acoustic horns.

FAILURE TO FOLLOW SAFETY PRECAUTIONS DESCRIBED BELOW WILL RESULT IN EXPOSURE TO INTENSE SOUND WAVES AND MAY CAUSE PAIN, BODILY INJURY, OR PERMANENT HEARING LOSS.

INSTRUCT ALL PERSONS WORKING IN OR NEAR COMPARTMENTS OR CONFINED SPACES CONTAINING ACOUSTIC HORNS ON THE FOLLOWING SAFETY PRECAUTIONS AND OF THE DANGER OF EXPOSURE TO INTENSE SOUND WAVES:

1. Never enter any compartment or confined space containing an acoustic horn for any reason without doing the following:
 - De-energize the electrical controls for the horns and lock them out.
 - Turn off the manual compressed air supply valve for the horn(s) and lock it out.
2. Never enter any compartment or confined space containing an acoustic horn for any reason without first locking open the access door to the compartment or confined space.
3. Attach warning signs furnished with the horn next to all access doors to any compartment or confined space containing acoustic horns. **LOCATE SIGNS WHERE THEY WILL BE SEEN.** If you have not received enough signs to place next to all access doors, immediately call GE Energy at 800-821-2222 and additional signs will be provided at no extra cost.
4. Never enter any compartment or confined space containing acoustic horns without wearing adequate hearing protection. Always avoid prolonged exposure to high noise levels.
5. Obtain permission from a supervisor before installing, inspecting, maintaining, or removing any acoustic horn, or entering—for any reason—a compartment or confined space containing acoustic horns.
6. Know the general locations of the acoustic horns and that periodic noise is to be expected in those locations. Unexpected noise from an acoustic horn may startle a person working nearby, resulting in an accident.

Warning Sign



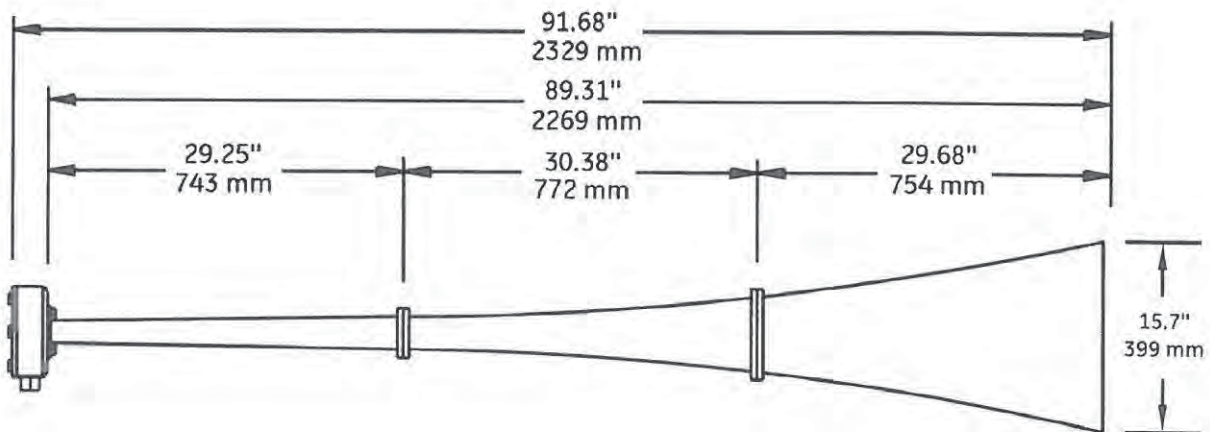
Danger sign provided with acoustic horn for use on access doors.
(Actual size is 8 1/2" x 5 1/2")

Specifications and Dimensional Data

Powerwave® Model D-75

The model D-75 Powerwave acoustic cleaner produces 147dB at one meter with a fundamental frequency of 75 Hz.

Fundamental Frequency (Hertz)	75 Hz
Output Power Level (Decibels)	147 dB
Material	Cast Malleable Iron (Stainless Steel)
Diaphragm Material	Gr. 4 Titanium
Max Operating Temperature	1600° F (870°C)
Weight	127 lbs. (57.61 kg)
Air Consumption	60-80 SCFM @ 70-90 PSI (28-38 l/s @ 4.83-6.21 bar)



D-75

Installation:

The Powerwave acoustic cleaning system that has been supplied for your SCR reactor has been specifically designed and engineered to meet the unique demands of your application. It is imperative that it be installed, operated and maintained properly to assure trouble-free operation and adequate cleaning of the SCR catalyst. Refer to the Mechanical Drawings section included in this manual for specific installation and operational instructions. If it becomes necessary to make any modifications to the location of the acoustic cleaners, please contact GE Energy for recommendations.

Horn placement is critical to the effective operation of the cleaning system, any deviation from the installation drawing provided for this system should be reviewed/approved by GE Energy.

The following items should be reviewed prior to start-up of a system:

1. **Air piping:** Proper airflow to the acoustic cleaner is critical to sounding. Verify that existing air piping design is sized per the installation drawing provided for this system.
2. **Air pressure:** 70 to 90 PSI is the recommended pressure to sound the horns. Check the air pressure before and during sounding of the acoustic cleaners. Ideally the air pressure will be about 80 PSI which is in the middle of our stated air pressure requirements.
3. **Verify operation:** Prior to full scale start-up, listen to each acoustic cleaner as it operates to make sure that the acoustic cleaners are sounding properly. You should hear a definite "foghorn" tone and may even feel some resonance in your feet or body when the acoustic cleaner sounds. If the horn makes a very high pitched squeal or doesn't sound at all, refer to the troubleshooting section of this manual or contact a GE Energy representative for assistance.
4. **Verify sounding sequence:** The actual sounding sequence of the acoustic cleaners should be checked to make sure that the proper operating sequence is being employed.

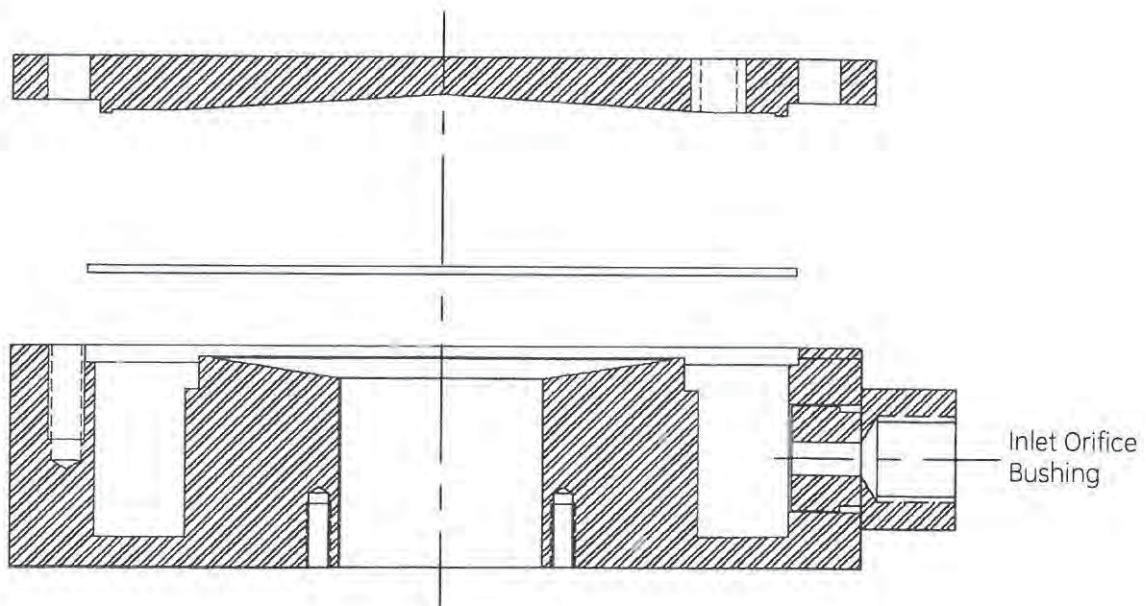
Plumbing

The compressed air piping system for your Powerwave acoustic cleaning system has been specifically designed and engineered to meet the needs of your system. Please refer to the Mechanical Drawings section included in this manual for specific piping and installation diagrams.

Pipe sealants have been known to dislodge and be carried down the airline and be trapped inside the driver. Either PTFE tape or pipe dope sealants are acceptable. **When using PTFE tape, make sure the tape does not web across the pipe. Do not use excessive pipe dope, as particles may dislodge and be carried to the driver.**

All Powerwave acoustic cleaners utilize a specially machined inlet orifice reducer at the driver (see figure). This component is critical to the effective operation of the device and if damaged should be replaced only with the approved GE Energy part.

NOTE: Before attaching the air line to the inlet orifice bushing, blow down the air lines at full line pressure for at least 20 seconds to ensure that all pipe scale and debris is cleared from the line. If this is not done, the scale and debris may plug the inlet orifice bushing or facilitate wear on the diaphragm and diaphragm seat surfaces. **When blowing down the air lines, do not stand in front of them.**



Powerwave Driver Inspection Procedure and Report

WARNING: ALWAYS WEAR ADEQUATE HEARING PROTECTION WHEN TESTING HORNS.

The objective of this inspection is to identify signs or conditions of wear or deterioration of the internals of the driver. Physical dimensions and condition of components within the driver can have a dramatic effect on the power output of the acoustic cleaner.

The most important areas are the primary seat and the backing cap seat. The backing cap and driver body "pinch" the diaphragm into the proper location.

Disassembly

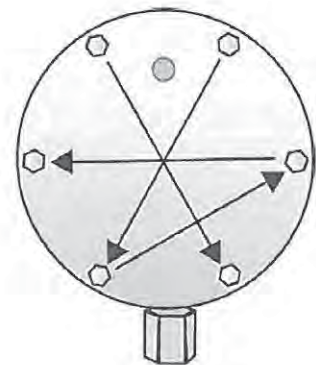
1. Remove the 3 (three) hex head cap screws that attach the driver to the horn bell.
2. Place the driver assembly on a flat surface so that the end that attaches to the bell is facing down.
3. Remove the 6 (six) hex head cap screws from the driver backing cap and remove the cap and diaphragm plate.

Inspection

1. Inspect the driver for any debris (metal shavings, rust, scale, etc.).
2. Clean the internal area of the driver with a non-abrasive solvent and check for pitting, cuts, or gouges. If internal deterioration or gouging are severe enough to allow air passage between plenums, the driver should be replaced.
3. Measure the height of the primary seat. (Refer to No. 1, Acoustic Driver Inspection Report.) If the seat height is out of tolerance, the driver should be replaced or remachined.
4. Inspect the backing cap for excessive or uneven wear. (Refer to No. 2, Acoustic Driver Inspection Report.) If the seat height is out of tolerance, the backing cap should be replaced or remachined.
5. Inspect the diaphragm plate for wear, cracking, pitting or any other signs of deterioration. Replace the diaphragm plate if any deterioration is noticed.
6. Inspect the backing cap gasket for any signs of deterioration. Replace if necessary.

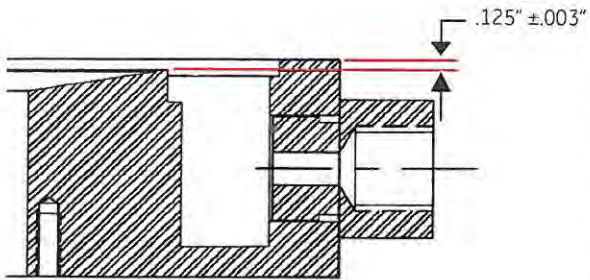
Assembly

1. Install diaphragm plate in driver body.
2. Install backing cap gasket on the driver body.
3. Install the backing cap and tighten the 6 (six) hex head cap screws securely using a rotation as illustrated at right.
4. Install the driver securely on the horn bell using the 3 (three) hex head cap screws.
5. Test horn prior to installation to check for air leaks and proper operation.



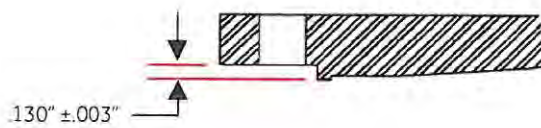
1. PRIMARY SEAT

Inspection Comments:

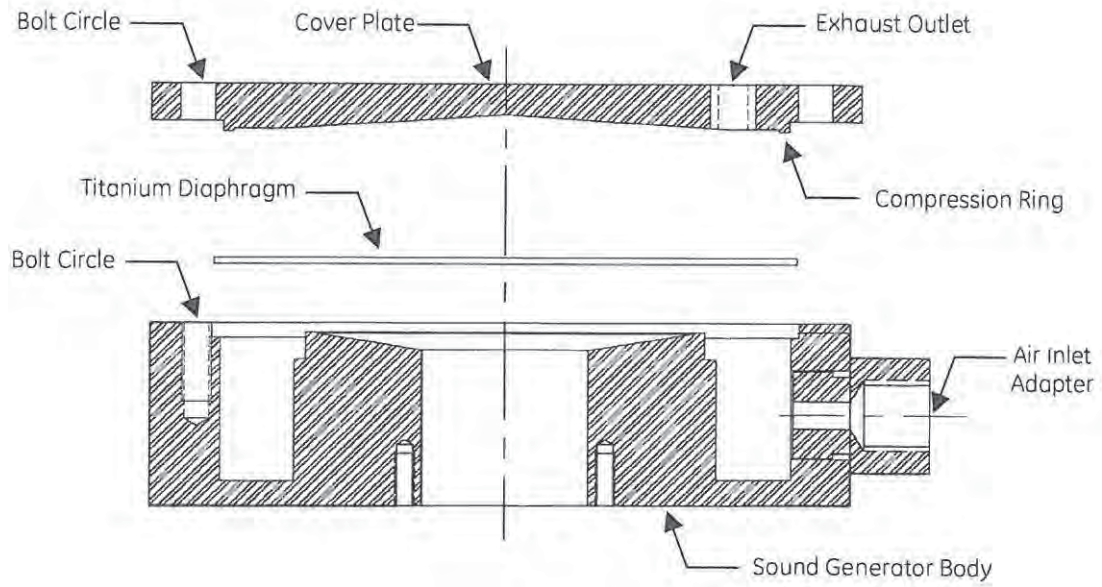


2. BACKING CAP SEAT

Inspection Comments:

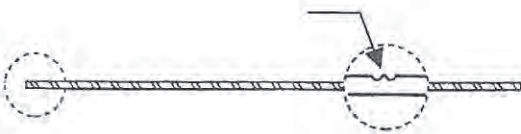


3. DRIVER ASSEMBLY



4. DIAPHRAGM PLATE

Inspection Comments:



Troubleshooting

Horn does not sound at all

Possible Cause:

- Inadequate air supply
- Airline plugged
- Solenoid valve malfunction
- Cracked diaphragm

Probable Solution:

- Check air line pressure
- Clean out
- Operate valve with manual operator (If horn operates check electrical system and controls for proper connection and operation.)
- Replace

Horn Sounds, but not at full output

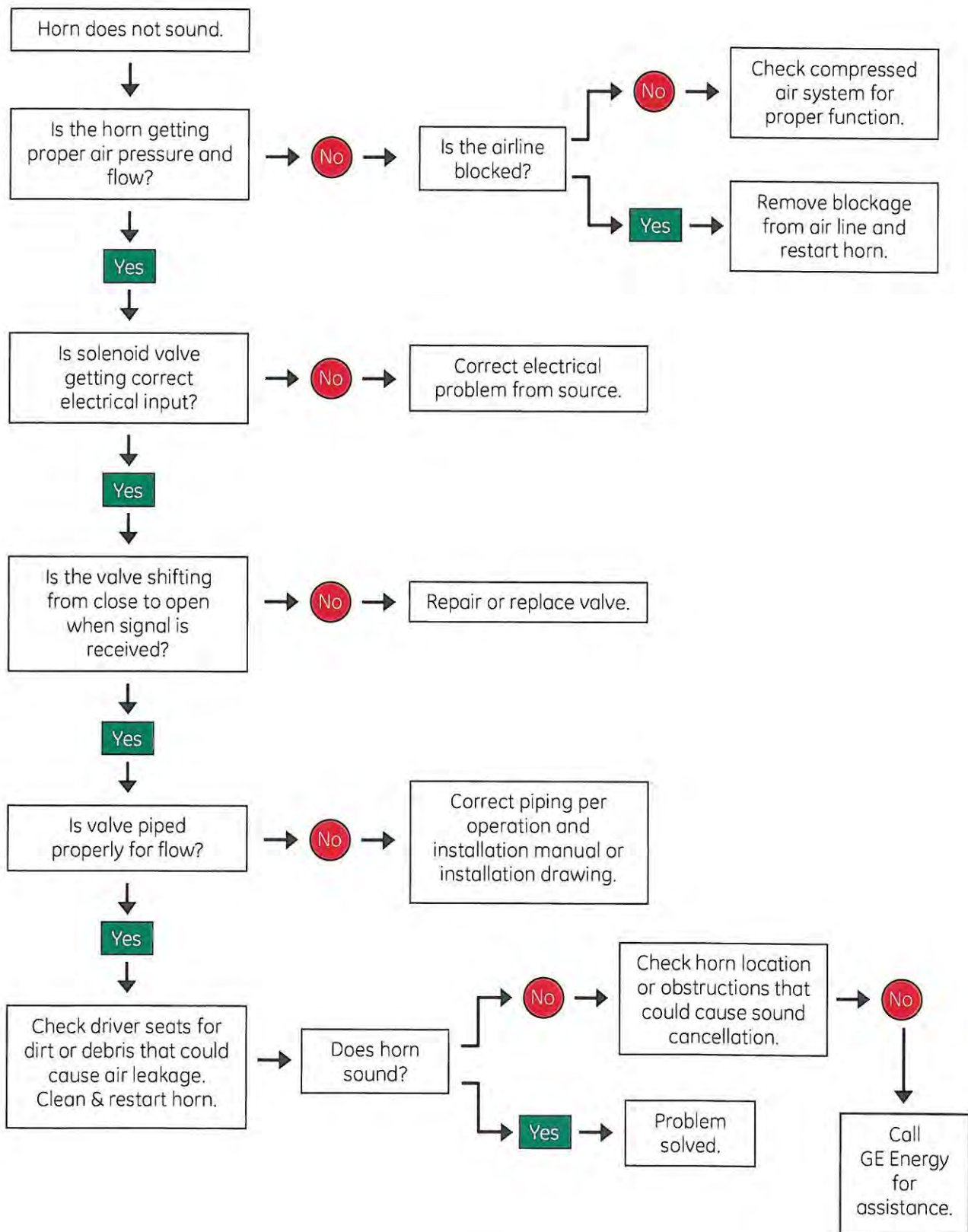
Possible Cause:

- Inadequate air supply
- Build-up inside horn (makes high-pitched sound)
- Insufficient crown in diaphragm or worn out diaphragm
- Moisture in air supply

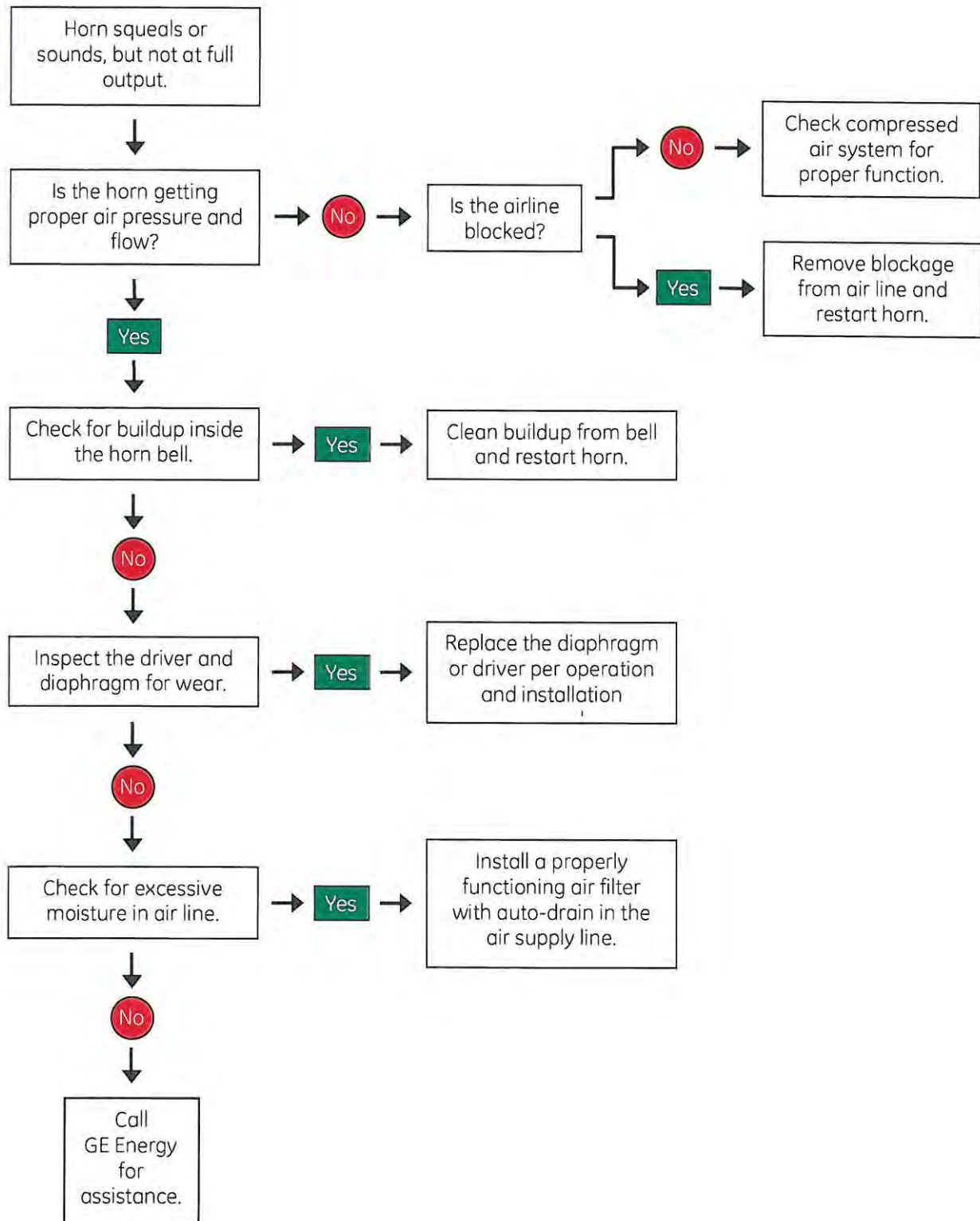
Probable Solution:

- Check pressure while operating
- Clean out and blow more often
- Inspect driver and diaphragm (see maintenance section, page 10)
- Check system air filter

Troubleshooting Chart A



Troubleshooting Chart B



Air Filter

Large Flow Air Filter Series AF800/900



Standard Specifications

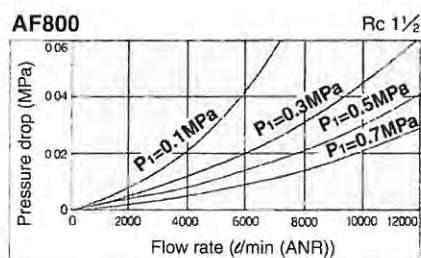
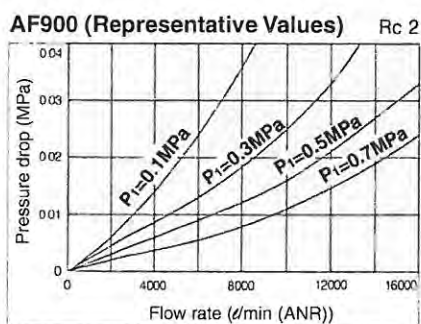
Model	AF800	AF900
Port size	1 1/4 1 1/2	2
Proof pressure	1.5 MPa	
Maximum operating pressure	1.0 MPa	
Ambient and fluid temperature	-5 to 60°C (No freezing)	
Filtration	Standard specifications: 5 µm Option: 2, 10, 20, 40, 70, 100 µm	
Bowl material	Polycarbonate	
Bowl capacity (cm³)	180 cm³	
Mass (kg)	3.15	5.45
Accessory (Standard)	Bowl guard	

Accessory (Option)/Part No.

Description	Model	Part no.	
		AF8□□	AF9□□
Float type auto drain *	N.O	AD34 (Bowl material: Nylon)	AD34 (Bowl material: Nylon)
(Bowl assembly)	N.C	AD16M (Bowl material: Polycarbonate)	AD16M (Bowl material: Polycarbonate)

* Min. operating pressure: 0.1 MPa (N.O.), 0.15 MPa (N.C.)

Flow Characteristics (Representative Values)



How to Order

AF 8 00 - 12 - 127 - R

Air filter

Body size

8	1 1/2
9	2

Auto-drain specifications

00	None
10	Float type auto drain (N.C.)
11	Float type auto drain (N.O.)

Thread type

Nil	Rc
N	NPT
F	G

Option

D	Drain cock thread piping (Rc 1/4)
J□*4	Drain guide
R	Flow direction: Right to left

Option

1*1	Optional filtration rate
2	Metal bowl
6	Nylon bowl
7*2	Stainless steel element
8	Metal bowl with level gauge
9*3	Without drain cock

Port size

12	1 1/4
14	1 1/2
20	2

Note 1 When specifying more than one number, indicate them in numerical order.
(Ex.) 127-40

Note 2 When specifying more than one alphabet symbol, indicate them alphabetically and put "-" between them.
(Ex.) D-R

Note 3 Options for "2", "6", and "8" can not be specified at the same time.
(Ex.) 68

Note 4 Symbols "9", "D", "J" can not be specified at the same time.
(Ex.) 9-D-J

Note 5 For products with auto drain, either symbol "D" or "J" cannot be specified at the same time because of female threads (3/8 or 1/8), for connection to drain piping.

Note 6 For N.C. type with auto drain, metal case with liquid level indicator is not available.

* 1 Indicate the required filtration rate after the symbol "1".
Ex.) When 40 µm is required: 1-40

* 2 If indicating "7" only, the filtration rate is 5 µm. Optional filtration rate is required, indicate like 17-□.
Ex.) When requiring "stainless steel and 40 µm": 17-40

* 3 The bowl of series AL is used.

* 4 This symbol "□" indicates the port size.

1	Rc 1/4
6	NPT 1/4
8	G 1/4

AC

AF□

AR

AL

AW□

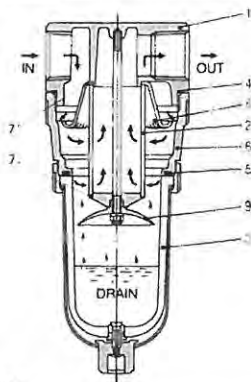
A□G

AV

AF800
AF900

Series AF800/900

Construction



Component Parts

No.	Description	Material		Note
		AF800	AF900	
1	Body	Aluminum die-casted	Aluminum casted	Platinum silver painted
6	Housing	Aluminum die-casted	Aluminum casted	Platinum silver painted

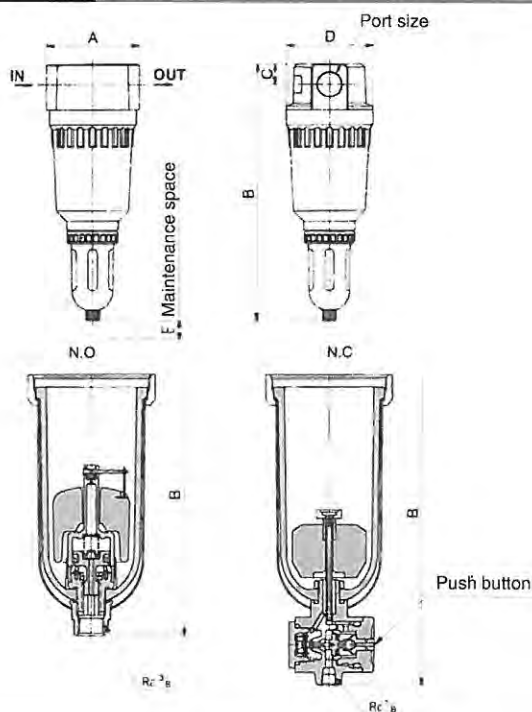
Replacement Parts

No.	Description	Material	Part no.		Qty.
			AF800	AF900	
2	Element	Standard Bronze	11345-5B	11352-5B	1
		-7 Stainless steel	11345-5S	11352-5S	1
3	Bowl assembly	Standard —	AF11-4	11316A)*	1
		-2 —	AF11-4-2		
		-6 —	AF11-4-6	1131123A)*	
		-8 —	AF-8		
		-9 —	AF11-4-9	113120)*	
4	O-ring	NBR	JIS B2401 G130	630332	1
5	O-ring	NBR	113136	113136	1
7	Element seal	NBR	11217	112310	2
8	Deflector	Aluminum	11346	11355	1
9	Buffer	AF800 ADC	11344	—	1
		AF900 Aluminum casted	—	11354	

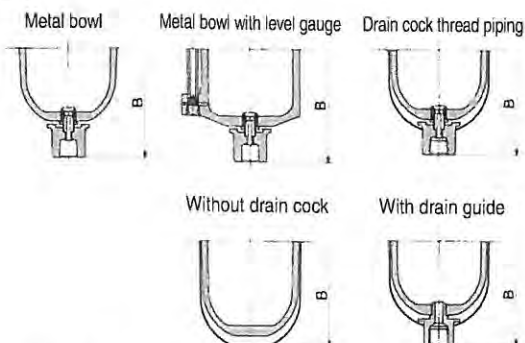
* A bowl, bowl guard, clamp ring and drain cock are assembled.

(): A bowl and a drain cock are assembled. -9 does not include a drain cock.

Dimensions



Option



Option/Dimensions

Model	A	B	C	D	B (With auto drain)		E
					N.O.	N.C.	
AF800	150	410	33	140	439	440	200
AF900	200	490	46	170	519	520	260

Model	B (Without auto drain)				
	Metal bowl	Metal bowl with level gauge	Without drain cock	Drain cock thread piping	With drain guide
AF800	409	440.5	393.5	410	406.5
AF900	489	520.5	473.5	490	486.5

⚠ Precautions

Be sure to read before handling.

Refer to front matters 42 and 43 for Safety Instructions and pages 287 to 291 for F.R.L. Precautions.

Selection

⚠ Warning

Use auto drain under the following conditions. Otherwise, it may result in a malfunction.

- Float type auto drain (N.O.)
 - Use compressor with capacity more than 3.7 kW (400 d/min (ANR))
 - Set operating pressure more than 0.1 MPa.
- Float type auto drain (N.C.)
 - Compressor can be used even if energy is under 3.7 kW.
 - Set operating pressure more than 0.15 MPa.

446

Piping

⚠ Warning

Be sure to pipe auto drain under the following conditions. Otherwise, it may result in a malfunction.

- Float type auto drain (N.O.)

When making drain exhaust piping, use piping with bore size $\phi 10$ or larger than $\phi 10$.
Length should be shorter than 5 m. Do NOT make upward piping.
- Float type auto drain (N.C.)

DO NOT pipe upwards.

Air Regulator

Pilot Operated Regulator

Series AR425 to 935

Standard Specifications

Model	AR425	AR435	AR625	AR635	AR825	AR835	AR925	AR935
Port size	1/4, 3/8, 1/2		3/4, 1		1 1/4, 1 1/2		2	
Fluid	Air							
Proof pressure	1.5 MPa							
Max. operating pressure	1.0 MPa							
Set pressure range (MPa) ⁽¹⁾	0.05 to 0.83	0.02 to 0.2	0.05 to 0.83	0.02 to 0.2	0.05 to 0.83	0.02 to 0.2	0.05 to 0.83	0.02 to 0.2
Air consumption (for bleed hole) ⁽²⁾	5 ℓ/min (ANR) (at maximum pressure)							
Pressure gauge port size	1/4							
Ambient and fluid temperature	-5 to 60°C (No freezing)							
Construction	Internal pilot relieving type (Pilot air is always bleeding.)							
Mass (kg)	0.7		1.1		2.5		4.5	



Note 1) Outlet pressure range: P2 is 90% of P1 or less.

Note 2) Air consumption differs depending on the set pressure. Due to the construction, the pressure gap between inlet and outlet cannot be set within 0.03 MPa, even if the handle is set at the maximum.

Accessory (Option)/Part No.

Description	Model	Part no.
Bracket	AR4□5	B24P
Pressure gauge with limit indicator ^{Note 1)}	AR6□5	B25P
	AR8□5	—
	AR9□5	—
		G46-10-□02 (Max. 1.0 MPa), G46-2-□02 (Max. 0.2 MPa)



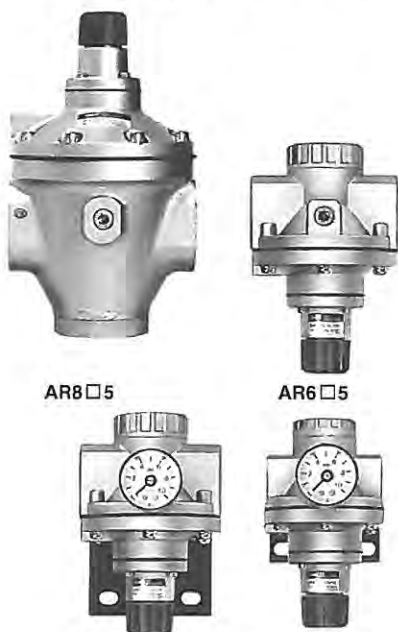
Note 1) In the gauge part no. (e.g. G46-10-□02), □ indicate kind of the connecting thread. Put nothing for Rc and "N" for NPT thread.

Please consult with SMC for NPT pressure gauge.

Note 2) Use caution not to tighten excessively when mounting a pressure gauge, otherwise it may result in a breakdown. Use a pipe tape for sealing. Recommended torque: 12 to 14 N·m.

How to Order

Internal pilot operated relieving type regulator



AR8□5

AR6□5

AR6□5-□□BG AR4□5-□□BG

AR 4 25 - 02 BG -

Regulator

Body size

4	1/2
6	1
8	1 1/2
9	2

Regulating pressure range

25	0.05 to 0.83MPa
35 ^{Note)}	0.02 to 0.2MPa

Note) Compared with AR□25 type, its adjusting spring will only be changed for 0.2 MPa. It is not the product which does not allow the pressure more than 0.2 MPa.

Port size

02	1/4
03	3/8
04	1/2
06	3/4
10	1
12	1 1/4
14	1 1/2
20	2

Thread type

Nil	Rc
N	NPT
F	G

Option

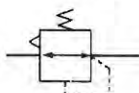
Nil	None (Standard)
R	Flow direction: Right to left

Accessory

Symbol	Description	Applicable model
Nil	—	—
B	With bracket	AR4□5 to 6□5
G	Gauge	G46-10-02 AR□25
		G46-2-02 AR□35
P ^{Note)}	Pressure gauge	G46-P10-02-X30 AR□25
		G46-P2-02-X30 AR□35

Note) Pressure display unit: MPa, psi
* Pressure gauges are shipped with regulator, (but not assembled).

JIS Symbol



Pilot Operated Regulator *Series AR425 to 935*

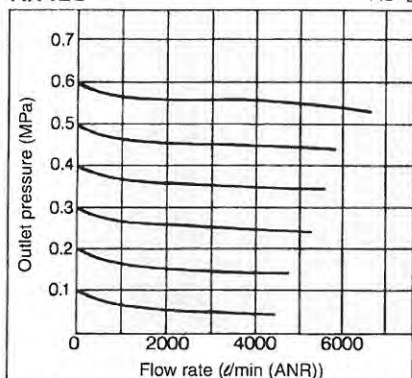
Flow Characteristics (Representative values)

Inlet pressure: 0.7 MPa

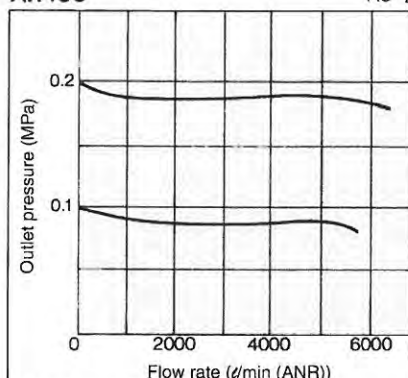
Pressure Characteristics (Representative values)

Conditions:
Inlet pressure 0.7 MPa
Outlet pressure 0.2 MPa
Flow rate: 20 dm^3/min (ANR)

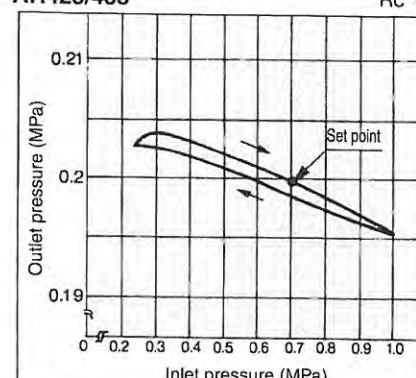
AR425 $Rc\ 1\frac{1}{2}$



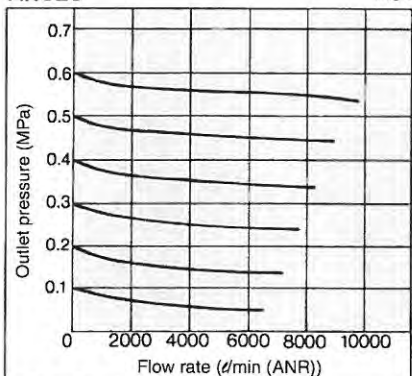
AR435 $Rc\ 1\frac{1}{2}$



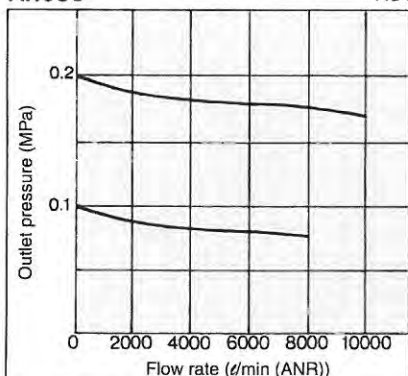
AR425/435 $Rc\ 1\frac{1}{2}$



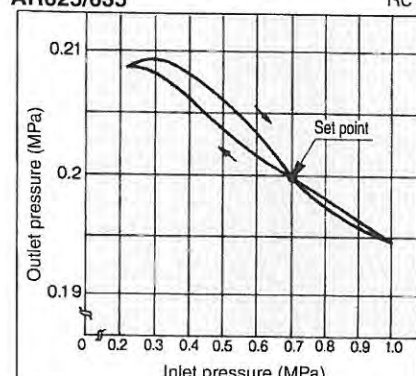
AR625 $Rc\ 1$



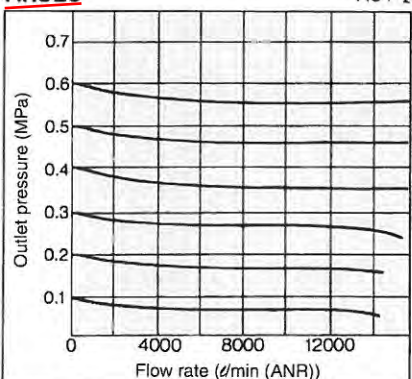
AR635 $Rc\ 1$



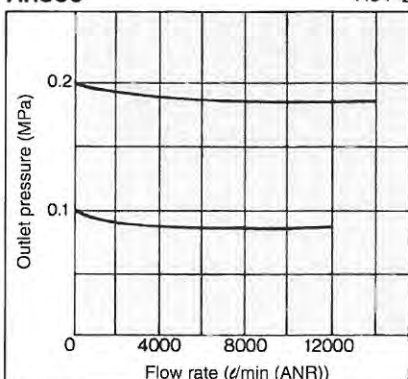
AR625/635 $Rc\ 1$



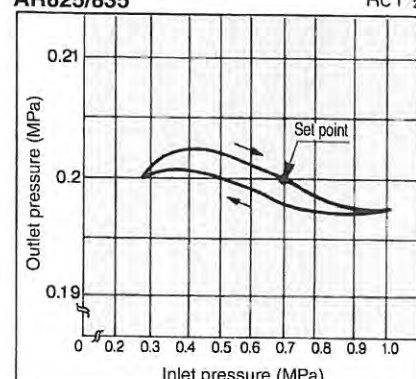
AR825 $Rc\ 1\frac{1}{2}$



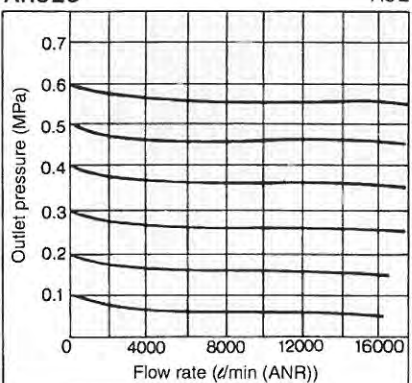
AR835 $Rc\ 1\frac{1}{2}$



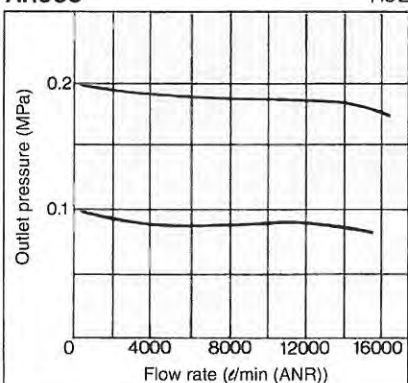
AR825/835 $Rc\ 1\frac{1}{2}$



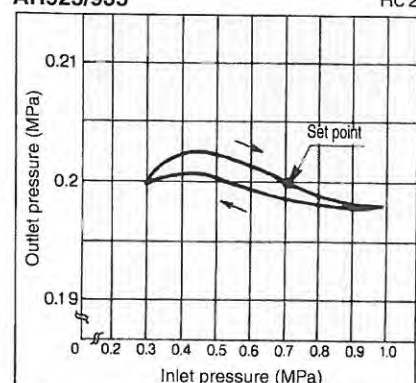
AR925 $Rc\ 2$



AR935 $Rc\ 2$



AR925/935 $Rc\ 2$



ARJ

AR425
to 935

AMR

ARM

ARP

IR

IRV

VEX1□

SRH

SRP

SRF

ARX20

VCHR

ITV

IC

PVQ

VEF
VEP

VER

VEA

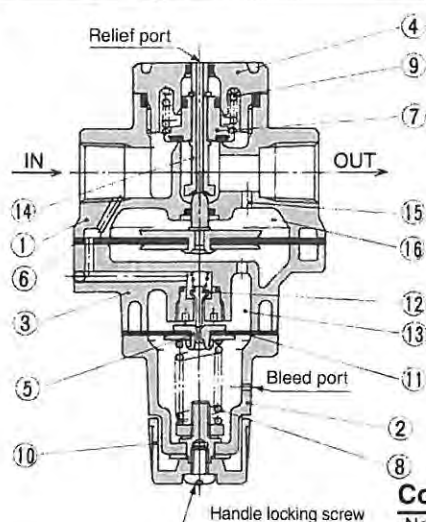
VY2

VBA
VBAT

AP100

Series AR425 to 935

Construction



When handle ⑩ is turned clockwise to compress pressure adjustment spring ⑧, the pressure from the IN side passes through diaphragm ⑪, opens pilot valve ⑫, and enters upper pilot chamber ⑬. This pressure and the force generated by pressure adjustment spring ⑧ act as resistance, resulting in equilibrium. Then, this pressure passes through diaphragm ⑥ of the main valve and stem ⑭, and pushes valve (main valve) ⑦ open, thus guiding the pressure to the OUT side. At the same time, the pressure passes through feedback hole ⑮, and enters diaphragm chamber ⑯, thus establishing the OUT side pressure (outlet pressure).

Component Parts

No.	Description	Material	Note
1	Body	Aluminum die-casted *	Platinum silver painted
2	Bonnet	Aluminum die-casted	Platinum silver painted
3	Chamber	Aluminum die-casted	Platinum silver painted
4	Valve guide	Zinc die-casted *	Platinum silver painted

* In the case of AR825/835/925/935, the material is aluminum alloy.

Replacement Parts

No.	Description	Material	Qty.	Part no.			
				AR425, 435	AR625, 635	AR825, 835	AR925, 935
5, 11	Exhaust valve assembly (Note)	—	1	132586A	132586A	132586A	132586A
6	Main valve side diaphragm assembly	—	1	132581A	132659A	13275A	13285A
7	Valve assembly	—	1	132572A	132653A	132752A	132829A
8	Adjusting spring	Steel wire	1	135053 (AR425) 135025 (AR435)	135053 (AR625) 135025 (AR635)	135053 (AR825) 135025 (AR835)	135053 (AR925) 135025 (AR935)
9	Valve spring	Stainless steel	1	135211	132656	132713	13289
10	Handle	ABS	1	13414			

Note) Diaphragm is included.

⚠ Precautions

Be sure to read before handling. Refer to front matters 42 and 43 for Safety Instructions and pages 287 to 291 for Precautions on every series.

Mounting/Adjustment

⚠ Warning

1. Install the valve guide (on the opposite side of the handle) 60 mm away from the ground surface to facilitate maintenance inspection.
2. Do not use the regulator with flow exceeding the Max. flow indicated in "Flow Characteristics" as this can cause failure in pressure adjustment.

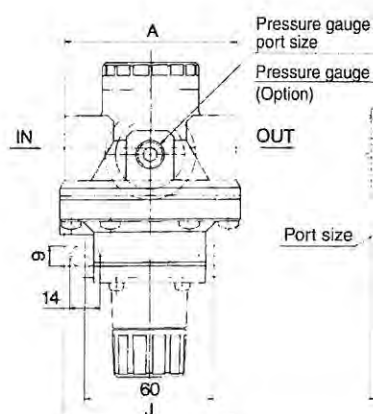
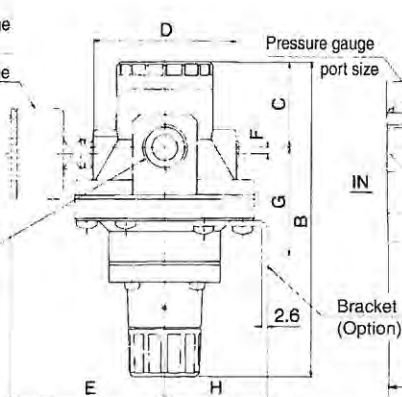
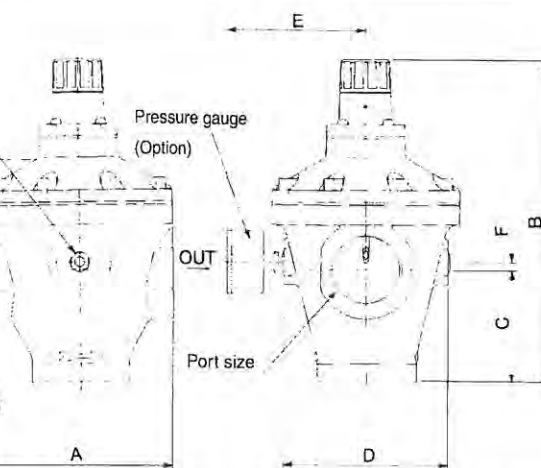
⚠ Caution

1. Release the lock to adjust the pressure. After the adjustment, engage the lock. Failure to observe this procedure could damage the handle or cause the outlet pressure to fluctuate.
<Lock operating method>
Loosen the handle locking screw to unlock it, and tighten it to lock it.
2. Please contact SMC if this product is to be used between solenoid valve and actuator.

Dimensions

AR425/435
AR625/635

AR825/835
AR925/935



* For products with pressure gauge, pressure gauges are shipped together with product.

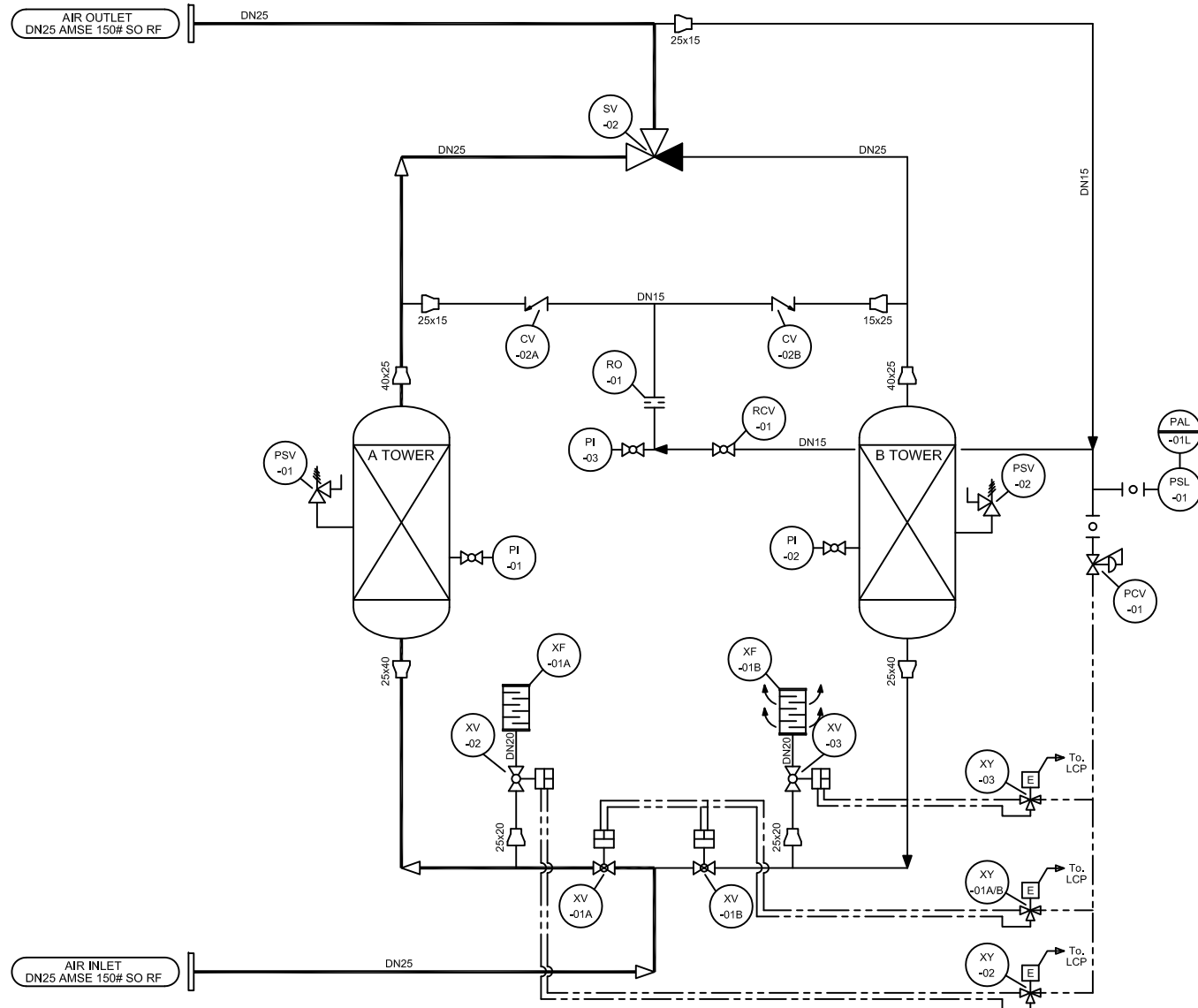
Model	Port size	Pressure gauge port size	A	B	C	D	E	F	Bracket dimensions			Bracket part no.
									G	H	J	
AR425/435	1/4, 3/8, 1/2	1/4	80	145.5	39.5	67	73	3	46.5	48	80	B24P
AR625/635	3/4, 1	1/4	98	155	43	78	78.5	7	85	52	90	B25P
AR825/835	1 1/4, 1 1/2	1/4	126	216	75	110	94.5	5	—	—	—	—
AR925/935	2	1/4	160	241	90	140	109.5	10	—	—	—	—

Air Dryer



<h1>DESICCANT AIR DRYER</h1> <h2>DATA SHEET</h2>				Rev.	Date	PAR'D	CHK'D	APP'D	Page
				0	2014. 11. 10	D G KIM		C.G.KIM	1 of 1
Rev	Owner	-		No. Req'd	-				
	Project Name	Vietnam Thai Binh2		Model No.	KSD-125A				
PROCESS DESIGN DATA									
DRYER TYPE HEATLESS PURGE TYPE									
FLUID COMPRESSED AIR				MAX. ALLOWABLE PRESS. DROP		0.2 barG			
INLET CONDITION				OUTLET CONDITION					
FLOW RATE 180 Nm ³ /hr				FLOW RATE 153 Nm ³ /hr					
PRESSURE(NOR) 7.0 barG				REGEN. AIR CONSUMPTION 27 Nm ³ /hr					
TEMPERATURE(NOR) 42 °C				PRESSURE(NOR) 6.8 barG					
RELATIVE HUMIDITY 100% at 42 °C				TEMPERATURE(NOR) 42 °C					
UTILITY AVAILABLE				DEW POINT -40 °C at atm.					
COOLING WATER barG °C				INSTALLATION ☐ INDOOR ☒ OUTDOOR					
CHILLED WATER barG °C				AREA CLASS ☐ HAZARDOUS AREA					
STEAM barG °C				☒ NON-HAZARDOUS AREA					
MAIN POWER SUPPLY 1 Ph 50Hz 220V				NOISE LEVEL(MAX.) 85 dB(A)					
CONTROL POWER 1 Ph 50Hz 220V				IN / OUT CONNECTION		INLET DN25 ASME 150# SO RF OUTLET DN25 ASME 150# SO RF			
MECHANICAL DESIGN DATA									
DESIGN PRESSURE 10 barG				MATERIAL					
DESIGN TEMPERATURE 100 °C				SHELL / HEAD SA106Gr.B / SA234WPB					
CORROSION ALLOWANCE 1.6 mm				INTERNAL(SCREEN) STS304					
CODE AND STANDARD				FLANGE A105					
VESSEL ASME SEC.VIII DIV.1 with Stamp				HEX. BOLT/NUT SA193 B7/SA194 2H					
PIPING DESIGN ASME, KS ST'D				GASKET Non-Asbestos					
MATERIAL ASME , KS ST'D				RADIOGRAPH EXAMINATION ☐ SPOT ☒ FULL					
STAMP U STAMP				STRESS RELIEF ☐ YES ☒ NO					
SPECIFICATION									
DESICCANT				OPERATION CONDITION					
☒ ACT.ALUMINA ☐ NS-10 ☐ M/S				CYCLE TIME 10 min					
WEIGHT(TOTAL) 68 kg/ 2Towers				OPERATION TIME					
MEDIUM OF REGEN				DRYING 5 min REGEN 4 min PRESURIZING 1 min					
☐ ELECTRIC HEATER ☒ DRY AIR				OPERATION AUTOMATIC					
☐ BLOWER ☐ STEAM				☒ TIME ☐ PPD-1 ☐ PPD-2					
UTILITY REQUIRED				SURFACE TREATMENT SSPC - SP10					
ELECTRIC HEATER KW				PAINTING					
STEAM HEATER Kg/hr				INTERNAL MAKER STD					
REGENERATION BLOWER KW				EXTERNAL 5Y7/1					
COOLING WATER m ³ /hr				CONTROL BOX 5Y7/1					
ACCESSORIES				METHOD PRIMER 2 COAT					
☒ SILENCER				DIMENSION					
☒ SAFETY VALVE				LENGTH 1,300 mm					
☒ PRESSURE GAUGE				WIDTH 900 mm					
☐ TEMPERATURE GAUGE				HEIGHT 2,170 mm					
☒ LOCAL CONTROL PANEL				WEIGHT (ABOUT) 350 Kg					
☐ DEMEND OPERATION SYSTEM				GUARANTEE 1 YEAR					
☐ ONE SKID & BY-PASS PIPING									
NOTE.									

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Note.

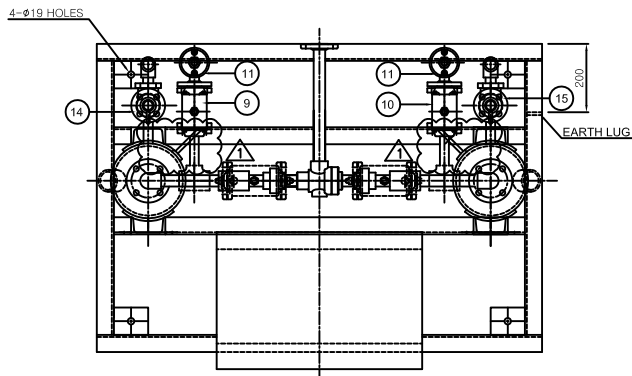
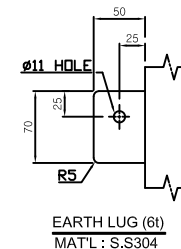
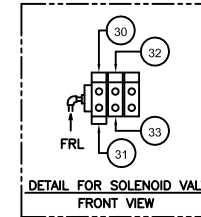
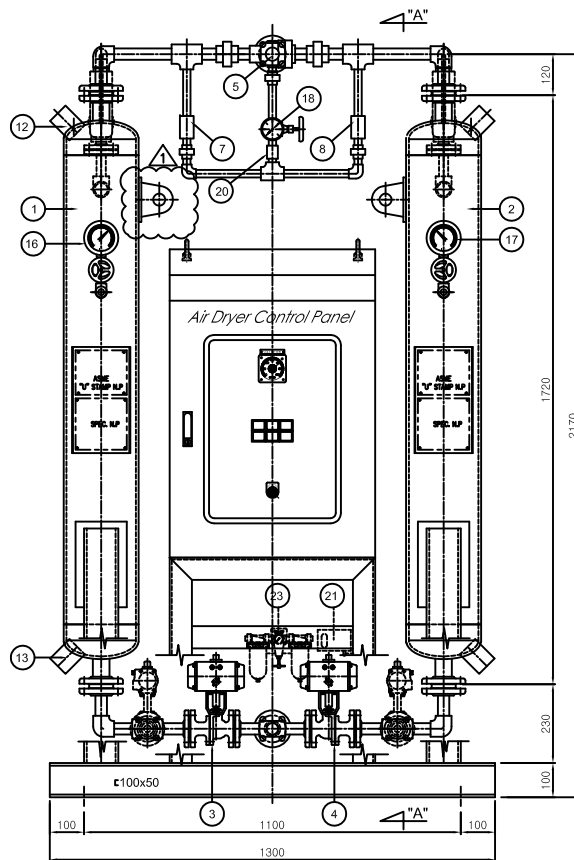
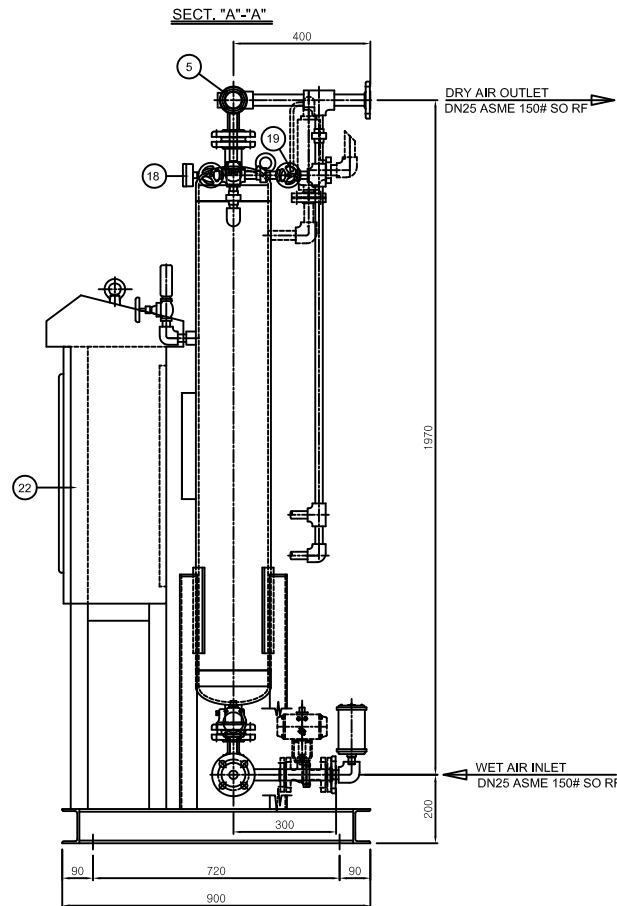
REV.	DATE	DESCRIPTION	DRAWN	CHKD	CHKD	APPD
1	2015.01.14	FOR CONSTRUCTION	C G KIM			



KEUMSUNG-HIGHTECH CO., LTD.

TITLE		HEATLESS TYPE AIR DRYER MODEL NO. : KSD-125A PIPING & INSTRUMENT DIAGRAM			
DATE	2014.11.11	VESSEL MODEL	DA-00050A	SCALE	N/S
W/O No.	201411-013	DWG NO.	TB2-SDC.VP124-00HTA-M-M1A-SPC-003-7	REV.	1

A3 (297X420mm)



No.	DESCRIPTION
1	Drying tower - A
2	Drying tower - B
3	Air Inlet 2-way Ball valve(A Tower)
4	Air inlet 2-way Ball valve(B Tower)
5	Air outlet service 3-way shuttle valve
7	A Tower purge flow check valve
8	B Tower purge flow check valve
9	A Tower purge 2-way ball valve
10	B Tower purge 2-way ball valve
11	A,B Tower purge silencer
12	Desiccant fill port
13	Desiccant removal port
14	A Tower Pressure safety valve
15	B Tower Pressure safety valve
16	A Tower pressure Indicator w/root valve
17	B Tower pressure Indicator w/root valve
18	Purge flow pressure Indicator w/root valve
19	Regeneration air control globe valve
20	Regeneration air flow resistance orifice
21	Low pressure switch
22	Air dryer local control panel
23	Air Unit(for on / off ball valve)
30	A Tower Inlet 4-way solenoid valve
31	B Tower Inlet 4-way solenoid valve
32	A Tower purge 4-way solenoid valve
33	B Tower purge 4-way solenoid valve

AIR DRYER SPECIFICATION	
PROCESS	: COMPRESSED AIR
INLET CAPACITY	: 180 Nm ³ /hr
PURGE AIR CONSUMPTION	: 27 Nm ³ /hr
OPERATING PRESSURE	: 7.0 barg
INLET AIR TEMPERATURE	: 38°C (Max.42°C)
DESIGN PRESSURE	: 10 barg
OUTLET DEW POINT	: -40°C at ATM.
PURGE AIR PRESSURE	: 3.0 barg
POWER SUPPLY	: 220V- 1Ph- 50Hz
ELECTRICALS	: IP-65(OUTDOOR)
OPERATION CYCLE	
DRYING	: 5 mins
REGENERATION	: 4 mins
PRESSURIZING	: 1 min
CORROSION ALLOWANCE	: +1.6 mm(VESSELS)
DESICCANT	: 68 Kg/2towers
PACKAGE TOTAL WEIGHT	: about 350 kg

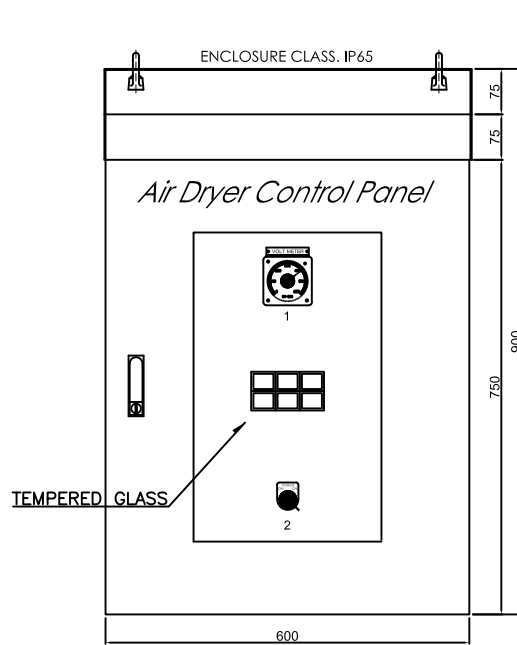
Note.

REV.	DATE	DESCRIPTION	DRAWN	CHKD	CHKD	APPD
1	2015.01.14	FOR CONSTRUCTION	D G KIM			

TITLE		SCALE	
HEATLESS TYPE AIR DRYER		N/S	
MODEL NO. : KSD-125A			
OUTSIDE DRAWING			
DATE	2014.11.10	VESSEL MODEL	DK-00050A
W/O No.	201411-013	DWG NO.	TB2-SDC.VP124-00HTA-M-M1A-SPC-003-8

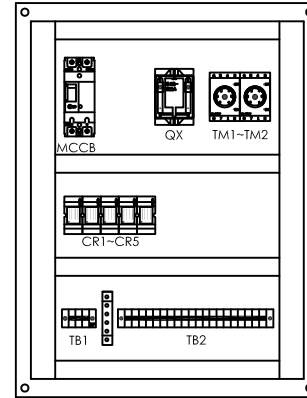
KEUMSUNG HIGHTECH CO., LTD.

1. MAIN POWER : AC220V-1PH-50Hz
2. PANEL MATERIAL : STS304
 BODY - 2.0t
 DOOR - 2.0t
3. PROTECTION CLASS : IP65

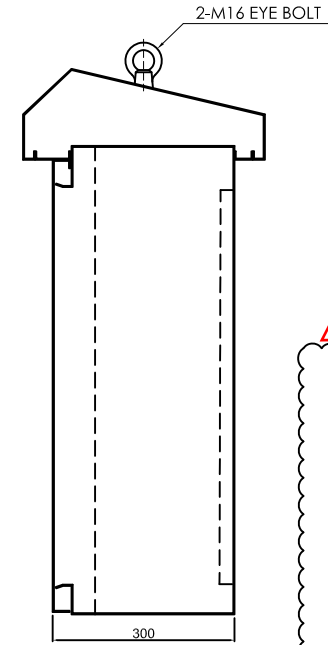


FRONT VIEW

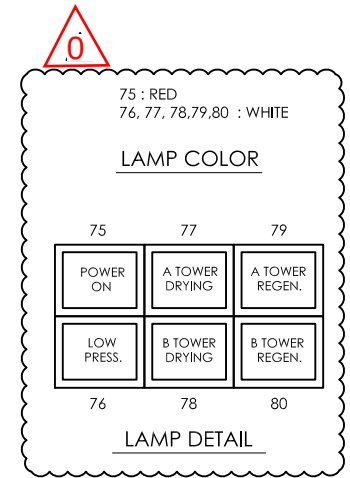
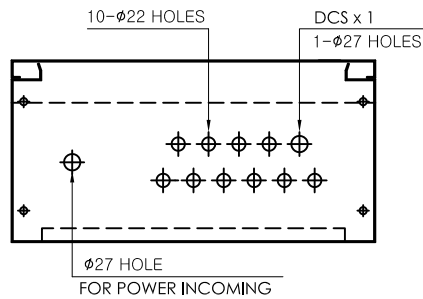
- The inner arrangement may be modified
by reason of manufacturing conditions.



INSIDE FRONT VIEW



SIDE VIEW



BOTTOM VIEW

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	VOLT METER	MCCB	MOLDED CASE CIRCUIT BREAKER
2	DRYER ON/OFF SELETOR SWITCH	QX	KEEP RELAY
		TM1	DRYING TIMER
75	POWER ON LAMP	TM2	PRESSURIZING TIMER
76	LOW PRESSURE LAMP	CR1~CR5	CONTROL RELAY
77	A TOWER DRYING LAMP	TB1~TB2	TERMINAL BLOCK
78	B TOWER DRYING LAMP	E	EARTH BAR
79	A TOWER REGENERATION LAMP		
80	B TOWER REGENERATION LAMP		

Note.

REV.	DATE	DESCRIPTION	DRAWN	CHKD	CHKD	APPD
1	2015.01.14	FOR CONSTRUCTION	J.S.BEAK			C.G.KIM

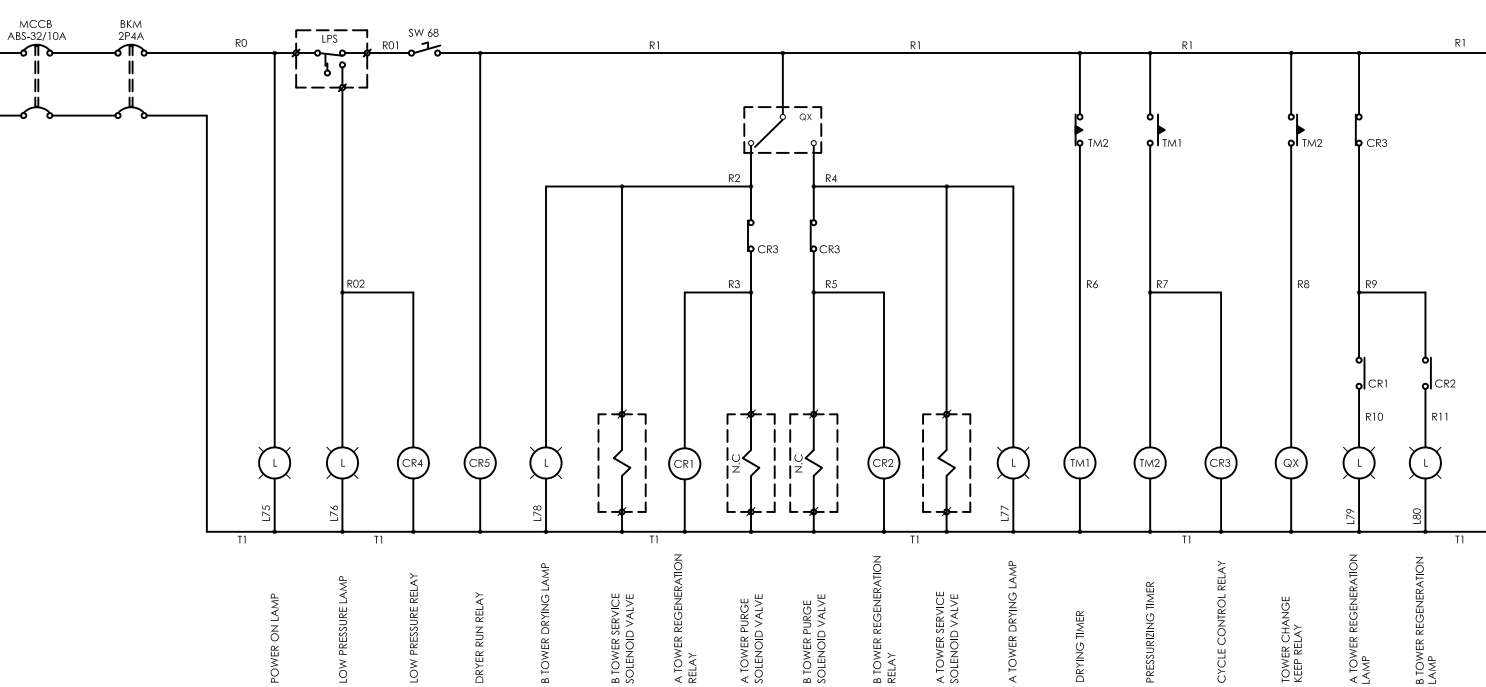


KEUMSUNG HIGHTECH CO., LTD.

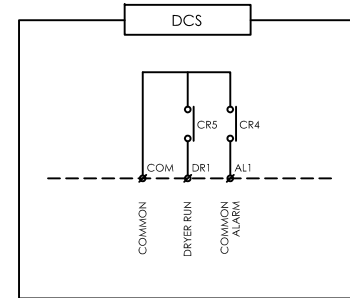
TITLE			
HEATLESS TYPE AIR DRYER MODEL NO. : KSD-125A CONTROL BOX DRAWING			
DATE	MODEL NO.	SCALE	N/S
2014.12.03	KSD-125A		
W/O No.	DWG NO.	REV.	
201411-013	TB2-SDC.VP124-00HTA-M-M1A-SPC-003-9		

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USER POWER
SUPPLY
AC 220V 1P 50Hz



ITEM	DESCRIPTION	ITEM	DESCRIPTION
V	VOLT METER	MCCB	MOLDED CASE CIRCUIT BREAKER
SW68	DRYER ON/OFF SELETOR SWITCH	BKM	CONTROL CIRCUIT BREAKER
L75	POWER ON LAMP	TM1	DRYING TIMER
L76	LOW PRESSURE LAMP	TM2	PRESSURIZING TIMER
L77	A TOWER DRYING LAMP	CR1~CR5	CONTROL RELAY
L78	B TOWER DRYING LAMP	L	LAMP
L79	A TOWER REGENERATION LAMP		
L80	B TOWER REGENERATION LAMP		



Note.

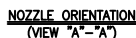
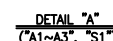
REV.	DATE	DESCRIPTION	DRAWN	CHKD	CHKD	APPD

REV.	DATE	DESCRIPTION	DRAWN	CHKD	CHKD	APPD

TITLE			
HEATLESS TYPE AIR DRYER			
MODEL NO. : KSD-125A			
ELECTRIC WIRING DIAGRAM			
DATE	2014.11.07	MODEL NO.	KSD-125A
SCALE	N/S		
W/O No.	201411-013	DWG NO.	TB2-SDC.VP124-00HTA-M-M1A-SPC-003-10
REV.			

A3 (297X420mm)

Air Receiver Tank



ASME CODE STAMPED
WORK (U)

WEIGHTNOZZLE AND CONNECTIONS

BILL OF MATERIAL

GENERAL NOTES

- 1-NPT 1/8" TEL-TALE

NOTE:

	01.14.2015	FOR CONSTRUCTION	K.W.KIM	J.K.MOON	C.Y.YANG	H.S.LEE
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PROJECT TITLE	THAI BINH2 THERMAL POWER PLANT 2 x 600MW
---------------	--

10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

Solenoid Valve



Pilot kick type 2 port solenoid valve
(general purpose valve)

ADK11/ADK12 Series

- NC (normally closed) type, NO (normally open) type
- Port size: Rc1/4 to Rc1
- Diaphragm structure



Excluding ADK12

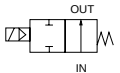


JIS symbol

- ADK11: NC (normally closed) type



- ADK12: NO (normally open) type



Common specifications

Item	Standard specifications	Optional specifications
Working fluid	Air, low vacuum (1.33×10^5 Pa (abs)), water, kerosene, oil (50 mm ² /s or less)	Hot water
Working pressure differential range MPa	0 to 1.0 (refer to max. working pressure differential in individual specifications.)	
Max. working pressure MPa	2	
Withstanding pressure (water) MPa	4	
Fluid temperature (Note 1) °C	-10 to 60	-10 to 90
Ambient temperature °C	-10 to 60	
Heat proof class	B	H
Atmosphere	Place free of corrosive gas and explosive gas	
Valve structure	Pilot kick type poppet, diaphragm structure	
Valve seat leakage (Note 2) cm ³ /min. (ANR)	1 or less (air)	
Mounting attitude	Free	
Body, sealant	Bronze, nitrile rubber	Bronze, ethylene propylene diene rubber

Note 1: No freezing

Note 2: For ADK11 (NC (normally closed) type), these values apply to pneumatic pressure 0.02 to 1.0 MPa, and for ADK12 (NO (normally open) type), these apply to pneumatic pressure 0.02 to 0.6 MPa.
When used at a pressure less than 0.02 MPa, the sealant may be unstable. Consult with CKD in this case.

Individual specifications

Item Model no.	Port size	Orifice (mm)	Min. working pressure diff. (MPa)	Max. working pressure diff. (MPa)						Rated voltage	Apparent power (VA)				Power consumption (W)		Weight (kg)		
				Air		Water, kerosene		Oil (50 mm/s)			Holding		Starting		AC	DC			
				AC	DC	AC	DC	AC	DC		50 Hz	60 Hz	50 Hz	60 Hz	50/60 Hz				
NC (normally closed) type																			
ADK11-8A	Rc1/4	12	0	1	0.7	1	0.7	0.7	0.6	100 VAC 50/60 Hz	24	19	61	54	10/8	11*2 (10.4)	0.65		
ADK11-10A	Rc3/8	12								110 VAC 60 Hz									0.65
ADK11-15A	Rc1/2	16								200 VAC 50/60 Hz									0.9
ADK11-20A	Rc3/4	23								220 VAC 60 Hz	25	21	84	75	10/8.5	14*3 (17)	1.0		
ADK11-25A	Rc1	28								12 VDC								1.4	
NO (normally open) type										24 VDC									
ADK12-15A	Rc1/2	16	0	0.6	0.6	0.6	0.6	0.5	0.5	48 VDC	30	25	180	150	13/11	14	1.0		
ADK12-20A	Rc3/4	23								100 VDC							1.2		
ADK12-25A	Rc1	28															1.6		

*1: The model numbers above show the basic port size (Rc). Refer to How to order for other combinations.

*2: The value in () is the power consumption for the type with DIN terminal box.

*3: The value in [] is the power consumption for the coil with diode.

*4: Refer to DC column for the maximum working pressure differential of coil with diode.

*5: Voltage fluctuation should be within ±10% of the rated voltage.

*6: Consider using the AB71 Series if the pressure is 0.02 MPa or less.

*7: When using with a low vacuum, vacuum the OUT port side.

Optional specifications

Sealant	Fluoro rubber		Ethylene propylene diene rubber	
Coil (heat proof class)	B	H	B	H
Fluid temperature °C	5 to 60	5 to 90	-10 to 60 (Note 1)	-10 to 90 (Note 1)
Ambient temperature °C	-10 to 60			
Valve seat leakage (Note 2) cm ³ /min. (ANR)	1 or less (air)			

Note 1: No freezing
Note 2: For ADK11 (NC (normally closed) type), these values apply to pneumatic pressure 0.02 to 1.0 MPa, and for ADK12 (NO (normally open) type), these apply to pneumatic pressure 0.02 to 0.6 MPa.
When used at a pressure less than 0.02 MPa, the sealant may be unstable. Consult with CKD in this case.

Flow characteristics

Model no.	Port size	Orifice (mm)	Flow characteristics			
			C [dm³/(s·bar)]	b	Cv flow factor	S (mm²)
NC (normally closed) type						
ADK11-8A	Rc1/4	12	9.2	0.36	2.0	—
ADK11-10A	Rc3/8	12	11	0.46	2.4	—
ADK11-15A	Rc1/2	16	20	0.31	4.5	—
ADK11-20A	Rc3/4	23	—	—	8.6	162
ADK11-25A	Rc1	28	—	—	12.0	231
NO (normally open) type						
ADK12-15A	Rc1/2	16	20	0.31	4.5	—
ADK12-20A	Rc3/4	23	—	—	8.6	162
ADK12-25A	Rc1	28	—	—	12.0	231

*1: Effective sectional area S and sonic conductance C are converted as S ≈ 5.0 × C.

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD

Medical
analysis

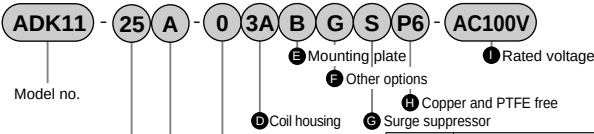
Custom
order

General purpose valve
Pilot kick type 2 Port Solenoid valve

ADK11/ADK12 Series

How to order

● NC (normally closed) type



*1
*2
*3
*4

Symbol	Descriptions			
A Port size				
8	1 / 4			
10	3 / 8			
15	1 / 2			
20	3 / 4			
25	1			
B Type of thread				
A	Rc			
G	G			
N	NPT			
C Body/sealant combination				
	Body	Sealant	Treatment	Remarks
0	Bronze	Nitrile rubber	-	Air, water, low vacuum, kerosene, oil (up to 60°C)
B		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)
D		Nitrile rubber		Air, water, low vacuum, kerosene, oil (up to 60°C)
E	Stainless steel	Fluoro rubber	Oil free	Air, low vacuum, kerosene, oil (up to 90°C *1)
H		Nitrile rubber		Air, water, low vacuum, kerosene, oil (up to 60°C)
J		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)
P	Option	Ethylene propylene diene rubber		Hot water (up to 90°C *1)
L		Nitrile rubber		Air, water, low vacuum, kerosene, oil (up to 60°C)
M		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)
R	Stainless steel	Ethylene propylene diene rubber		Hot water (up to 90°C *1)

Refer to page 36 in the Introduction for details on the material combinations.

D to I

Refer to the following page for details on the coil housing, other options and voltage, etc.

<Example 1 of model number>

ADK11-15A-02C-AC100V

Series: APK11

- A Port size: 1/2
- B Type of thread: Rc
- C Body/sealant combination
 - : Body - bronze, sealant - nitrile rubber
- D Coil housing: Grommet lead wire
- E to G : Blank
- I Rated voltage
 - : 100 VAC 50/60 Hz, 110 VAC 60 Hz

<Example 2 of model number>

ADK11-20N-B4ABS-AC200V

Series: ADK11

- A Port size: 3/4
- B Type of thread: NPT
- C Body/sealant combination
 - : Body - bronze, sealant - fluoro rubber
- D Coil housing
 - : Open frame lead wire (class H coil)
- E Mounting plate: Selected
- F Other options: Blank
- G Surge suppressor: Selected
- I Rated voltage
 - : 200 VAC 50/60 Hz, 220 VAC 60 Hz

Note on model no. selection

Note on C

- *1: C: When selecting 4A, 4M or 4N.
- *2: Only A (port size) 15 (1/2), 20 (3/4) or 25 (1) is available for C P/R.
- *3: The maximum working pressure differential is 0.6 MPa for the ethylene propylene diene rubber seal combination (C P/R).
- *4: The ethylene propylene diene rubber seal combination (C P/R) cannot be used with air. (Compressed air contains oil, and ethylene propylene diene rubber is not oil-resistant.)

For ② to ①, the combinations indicated with symbols can be manufactured.
Note that if options ⑤ to ⑧ are not required, no symbol is indicated.

D Coil housing			E	F Other options						G	H	I Rated voltage	
Descriptions			Mounting plate	Cable gland			Conduit			Surge suppressor	Copper and PTFE-free	Descriptions	
				(Marine cable gland)			(Conduit pipe)						
			A-15a	A-15b	A-15c	CTC19	G1/2						
2C	Option	Grommet lead wire	B							S	P6	100 VAC, 200 VAC	
2E		DIN terminal box (G1/2)										100 VAC, 200 VAC, 12 VCD, 24 VDC, 48 VDC, 100 VDC	
2G		DIN terminal box (Pg11)										100 VAC, 200 VAC, 24 VDC	
2H		DIN terminal box + small light (Pg11)										100 VAC, 200 VAC, 24 VDC	
3A		Open frame type	Lead wire	B				G	H		S	P6	100 VAC, 200 VAC 12 VCD, 24 VDC, 48 VDC, 100 VDC
3M			HP terminal box (G1/2)		D	E	F						100 VAC, 200 VAC, 12 VDC, 24 VDC, 100 VDC
3N			HP terminal box + light (G1/2)										100 VAC, 200 VAC, 12 VDC, 24 VDC, 100 VDC
3I			HP terminal box (IP65 or equivalent) (G1/2)										100 VAC, 200 VAC, 12 VDC, 24 VDC, 48 VDC, 100 VDC
3J		HP terminal box + light (IP65 or equivalent) (G1/2)						100 VAC, 200 VAC, 12 VDC, 24 VDC, 100 VDC					
4A		Open frame type (Heat proof class H)	Lead wire	B				G	H		S	P6	100 VAC, 200 VAC
4M			HP terminal box (G1/2)		D	E	F						100 VAC, 200 VAC
4N			HP terminal box + light(G1/2)										100 VAC, 200 VAC
5A		Open frame type (Diode integrated)	Lead wire	B				G	H			P6	100 VAC, 200 VAC
5M			HP terminal box (G1/2)		D	E	F						100 VAC, 200 VAC
5N			HP terminal box + light (G1/2)										100 VAC, 200 VAC
5I	HP terminal box (IP65 or equivalent) (G1/2)							100 VAC, 200 VAC					
5J	HP terminal box + light (IP65 or equivalent) (G1/2)							100 VAC, 200 VAC					

Refer to the following precautions for ② to ①.

2C		● Grommet lead wire 300 mm
2E 2G 2H		● DIN terminal box
3A 4A 5A		● Open frame grommet lead wire 300 mm ● 4A (heat proof class H) ● 5A (diode integrated)
3M 3N 4M 4N 5M 5N		● Open frame HP terminal box ● 4M, 4N (heat proof class H) ● 5M, 5N (diode integrated)
3I 3J 5I 5J		● Open frame HP terminal box (IP65 or equivalent) ● 5I, 5J (diode integrated)

Refer to page 224 for coil selection.

G H		● Conduit ● G (CTC19) ● H (G1/2)
--------	---	--

Note on model no. selection

Note on ②

*5: 5A, 5M, 5N, 5I and 5J are coils for which AC power is converted to DC with a diode.

Note on ③ to ⑥

- *6: Select one among D, E, F, G and H for ③.
- *7: The surge suppressor is an accessory for the lead wire coil. When selecting a coil with terminal box, the surge suppressor is mounted in the terminal box.
- *8: As standard, the surge suppressor is incorporated in the coil with diode and the 24 VDC coil (② 2H), so the surge suppressor symbol S cannot be selected.
- *9: Tropicalization (rust-proof coating) is available as a measure against rust. Contact CKD for more information.

Note on ①

- *10: 100 VAC coil is compatible with 100 VAC 50/60 Hz and 110 VAC 60 Hz, and 200 VAC coil is compatible with 200 VAC 50/60 Hz and 220 VAC 60 Hz. Note that the coils ② 5A/5M/5N/5I/5J can be used only with 100 VAC 50/60 Hz or 200 VAC 50/60 Hz.
- *11: For voltages other than above, consult with CKD.
- *12: The lead wire is available in the standard 300 mm length, and 500 mm, 1000 mm, 2000 mm and 3000 mm lengths. Contact CKD for more information.

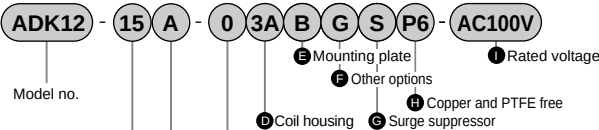
HNB/G
USB/G
FAB/G
FGB/G
FVB
FWB/G
FHB
FLB
AB
AG
AP/
AD
APK/
ADK
For
dry air
Explosion
proof
HVB/
HVL
SAB/
SVB
NP/NAP/
NVP
CHB/G
MXB/G
Other G.P.
systems
PD/FAD/
PJ
CVE/
CVSE
CPE/
CPD
Medical
analysis
Custom
order

General purpose valve
Pilot Kick type 2 Port Solenoid valve

ADK11/ADK12 Series

How to order

● NO (normally open) type



Symbol	Descriptions				
A Port size					
15	1 / 2				
20	3 / 4				
25	1				
B Type of thread					
A	Rc				
G	G				
N	NPT				
C Body/sealant combination					
	Body	Sealant	Treatment	Remarks	
0	Bronze	Nitrile rubber	-	Air, water, low vacuum, kerosene, oil (up to 60°C)	
B		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)	
D	Stainless steel	Nitrile rubber	-	Air, water, low vacuum, kerosene, oil (up to 60°C)	
E		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)	
H	Option	Nitrile rubber	Oil free	Air, water, low vacuum, kerosene, oil (up to 60°C)	
J		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)	
L		Ethylene propylene diene rubber		Hot water (up to 90°C *1)	
P	Stainless steel	Nitrile rubber		Air, water, low vacuum, kerosene, oil (up to 60°C)	
M		Fluoro rubber		Air, low vacuum, kerosene, oil (up to 90°C *1)	
R		Ethylene propylene diene rubber		Hot water (up to 90°C *1)	
Refer to page 36 in the Introduction for details on the material combinations.					
D to I					
Refer to the following page for details on the coil housing, other options and voltage, etc.					

<Example 1 of model number>

ADK12-20A-03A-DC24V

Series: ADK12

A Port size: 3/4

B Type of thread: Rc

C Body/sealant combination

: Body - bronze, sealant - nitrile rubber

D Coil housing: Open frame lead wire

E to **G**: Blank

I Rated voltage: 24 VDC

<Example 2 of model number>

ADK12-15G-B3NBD-AC100V

Series: ADK12

A Port size: 1/2

B Type of thread: G

C Body/sealant combination

: Body - bronze, sealant - fluoro rubber

D Coil housing: Open frame type with HP terminal box + light (G1/2)

E Mounting plate: Selected

F Other options: Cable gland A-15a

G Surge suppressor: Blank

I Rated voltage

: 100 VAC 50/60 Hz, 110 VAC 60 Hz

Note on model no. selection

Note on C

*1: C: When selecting 4A, 4M or 4N.

For ③ to ⑪, the combinations indicated with symbols can be manufactured.
Note that if options ⑤ to ⑨ are not required, no symbol is indicated.

D Coil housing				E	F Other options					G	H	I Rated voltage									
Descriptions			Mounting plate	Cable gland (Marine cable gland)			Conduit (Conduit pipe)		Surge suppressor	Copper and PTFE line	Descriptions										
				A-15a	A-15b	A-15c	CTC19	G1/2													
3A	Option Open frame type	Lead wire	B				G	H	S	P6	100 VAC, 200 VAC 12 VDC, 24 VDC, 48 VDC, 100 VDC										
3M		HP terminal box (G1/2)		D	E	F					100 VAC, 200 VAC, 12 VDC, 24 VDC, 100 VDC										
3N		HP terminal box + light (G1/2)									100 VAC, 200 VAC, 12 VDC, 24 VDC, 48 VDC, 100 VDC										
3I		HP terminal box (IP65 or equivalent) (G1/2)									100 VAC, 200 VAC, 12 VDC, 24 VDC, 48 VDC, 100 VDC										
3J	Option Open frame type (Heat proof class H)	HP terminal box + light (IP65 or equivalent) (G1/2)	B	D	E	F			S	P6	100 VAC, 200 VAC, 12 VDC, 24 VDC, 100 VDC										
4A		Lead wire												G	H	S	P6	100 VAC, 200 VAC			
4M		HP terminal box (G1/2)												D	E				F		
4N		HP terminal box + light (G1/2)																			
5A	Option Open frame type (Diode integrated)	Lead wire	B				G	H		P6	100 VAC, 200 VAC										
5M		HP terminal box (G1/2)		D	E	F															
5N		HP terminal box + light (G1/2)																			
5I		HP terminal box (IP65 or equivalent) (G1/2)																			
5J		HP terminal box + light (IP65 or equivalent) (G1/2)																			

⚠ Refer to the following precautions for ③ to ⑪.

3A 4A 5A		<ul style="list-style-type: none"> Open frame grommet lead wire 300 mm 4A (heat proof class H) 5A (diode integrated)
3M 3N 4M 4N 5M 5N		<ul style="list-style-type: none"> Open frame HP terminal box 4M, 4N (heat proof class H) 5M, 5N (diode integrated)
3I 3J 5I 5J		<ul style="list-style-type: none"> Open frame HP terminal box (IP65 or equivalent) 5I, 5J (diode integrated)

G H		<ul style="list-style-type: none"> Conduit G (CTC19) H (G1/2)
--------	---	--

Refer to page 224 for coil selection.

⚠ Note on model no. selection

Note on ③

*2: 5A, 5M, 5N, 5I and 5J are coils for which AC power is converted to DC with a diode.

Note on ⑤ to ⑥

*3: Select one among D, E, F, G and H for ⑤.

*4: The surge suppressor is an accessory for the lead wire coil. When selecting a coil with terminal box, the surge suppressor is mounted in the terminal box.

*5: The surge suppressor is incorporated in the coil with diode as standard.

*6: Tropicalization (rust-proof coating) is available as a measure against rust. Contact CKD for more information.

Note on ⑩

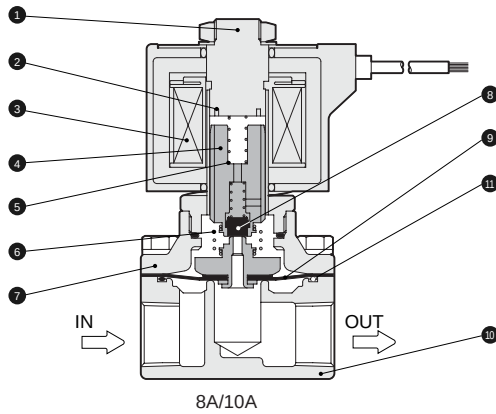
*7: 100 VAC coil is compatible with 100 VAC 50/60 Hz and 110 VAC 60 Hz, and 200 VAC coil is compatible with 200 VAC 50/60 Hz and 220 VAC 60 Hz. Note that the coils ⑩ 5A/5M/5N/5I/5J can be used only with 100 VAC 50/60 Hz or 200 VAC 50/60 Hz.

*8: For voltages other than above, consult with CKD.

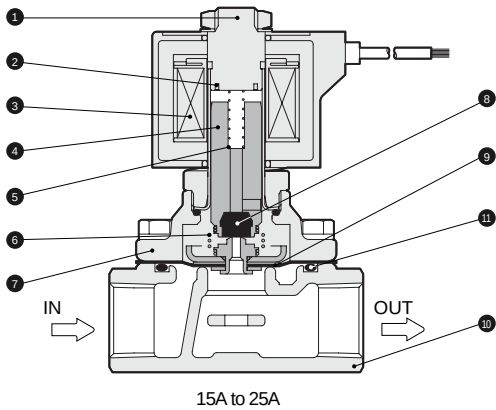
*9: The lead wire is available in the standard 300 mm length, and 500 mm, 1000 mm, 2000 mm and 3000 mm lengths. Contact CKD for more information.

Internal structure and parts list

● ADK11-8A/10A



● ADK11-15A/20A/25A

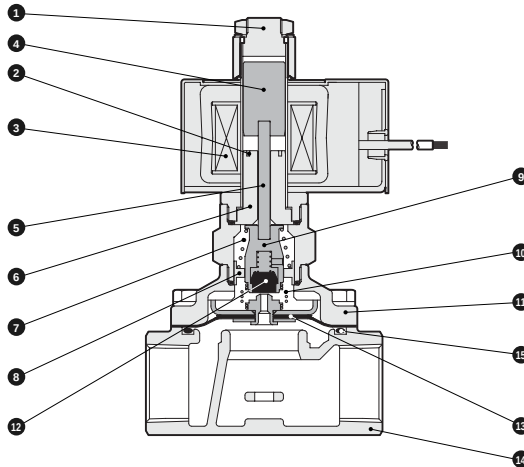


No.	Parts name	Material
1	Core assembly	SUS405 or equivalent, SUS316L, SUS403
2	Shading coil *1	Cu (Ag for stainless steel body)
3	Coil	—
4	Plunger assembly	SUS405 or equivalent, SUS304, NBR (SUS405 or equivalent, SUS304, FKM or EPDM) *2,3
5	Plunger spring	SUS304
6	Kick spring	SUS304
7	Stuffing	C3771 (SCS13)
8	Sealant	NBR (FKM, EPDM)
9	Diaphragm assembly	SUS303, SUS304, NBR (SUS303, SUS304, FKM or EPDM) *3
10	Body	CAC408 (SCS13)
11	O ring	NBR (FKM, EPDM)

() shows options.
*1: When using the DC coil or a coil with diode, no shedding coil is used.
*2: SUS304 is not used for port size 15 (1/2) to 25 (1).
*3: EPDM is not compatible with port size 8 (1/4) and 10 (3/8).

Internal structure and parts list

● ADK12 Series



No.	Parts name	Material	
1	Core assembly	SUS403, SUS316L, SUS304 *1	Stainless steel
2	Shading coil *2	Cu (Ag for stainless steel body)	Copper (silver for stainless steel body)
3	Coil	-	-
4	Plunger	SUS405 or equivalent	Stainless steel
5	Push rod	SUS304	Stainless steel
6	Fixed ferrous core	SUS405 or equivalent	Stainless steel
7	Spring	SUS304	Stainless steel
8	Spring holder	POM (SUS303)	Acetal resin (stainless steel)
9	NO valve assembly	SUS303, SUS304, NBR (SUS303, SUS304, FKM or EPDM)	Stainless steel, nitrile rubber (stainless steel, fluoro rubber or ethylene propylene diene rubber)
10	Kick spring	SUS304	Stainless steel
11	Stuffing	C3771 (SCS13)	Brass (stainless steel casting)
12	Sealant	NBR (FKM, EPDM)	Nitrile rubber (fluoro rubber or ethylene propylene diene rubber)
13	Diaphragm assembly	SUS303, SUS304, NBR (SUS303, SUS304, FKM or EPDM)	Stainless steel, nitrile rubber (stainless steel, fluoro rubber or ethylene propylene diene rubber)
14	Body	CAC408 (SCS13)	Bronze casting (stainless steel casting)
15	O ring	NBR (FKM, EPDM)	Nitrile rubber (fluoro rubber or ethylene propylene diene rubber)

() shows options.

*1: When the body/sealant combination symbol is other than O and H, the material is SUS430, SUS316L, SUS304.

*2: When using the DC coil or a coil with diode, no shedding coil is used.

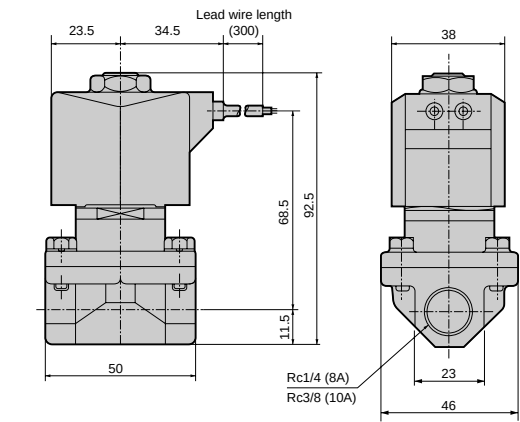
HNB/G
USB/G
FAB/G
FGB/G
FVB
FWB/G
FHB
FLB
AB
AG
AP/ AD
APK/ ADK
For dry air
Explosion proof
HVB/ HVL
SAB/ SVB
NP/NAP/ NVP
CHB/G
MXB/G
Other G.P. systems
PDF/FAD/ PJ
CVE/ CVSE
CPE/ CPD
Medical analysis
Custom order

General purpose valve
Pilot kick type 2 port solenoid valve

ADK11/ADK12 Series

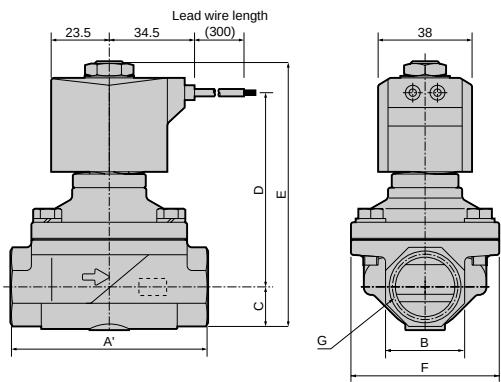
Dimensions: ADK11 Series

- Grommet lead wire type
ADK11-8A/10A-*2C



Note 1: The dimensions are the same for the G or NPT thread port size.

- Grommet lead wire type
ADK11-15A/20A/25A-*2C



Note 1: The dimensions are the same for the G or NPT thread port size.
Note 2: Dimensions shown in () are for SUS body.

Model no.	A	B	C	D	E	F	G
ADK11-15A-02C	71	27 (29)	14.5	75.5	102	50	Rc1/2
ADK11-20A-02C	80	32 (35)	17.5	79	108.5	60	Rc3/4
ADK11-25A-02C	90	41 (45)	22.5	84.5	119	71	Rc1

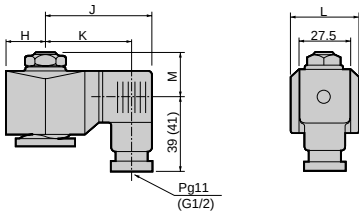
Optional dimensions: ADK11 Series



* Refer to the grommet lead wire type dimensions on the left page for common dimensions.

- DIN terminal box
ADK11-8A to 25A-^{*}

2E
2G
2H

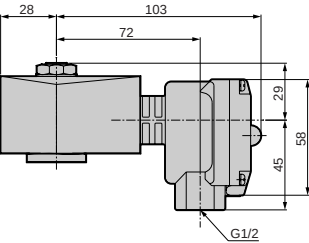


Dimensions shown in () are for G1/2.

Model no.	H	J	K	L	M
ADK11-8A~25A- [*] 2□-AC	23.5	65.5	54 (53.5)	38	22
ADK11-8A/10A- [*] 2□-DC	23.5	66	54.5 (54)	38	22
ADK11-15A~25A- [*] 2□-DC	28	72	60.5 (60)	46	22

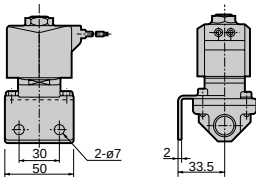
- Open frame type + HP terminal box
ADK11-8A to 25A-^{*}

3M	4M
5N	4N
I	J



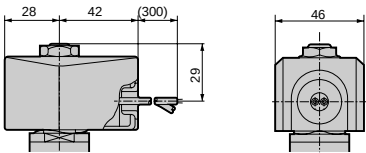
- Mounting plate
ADK11-8A/10A-^{***}

B



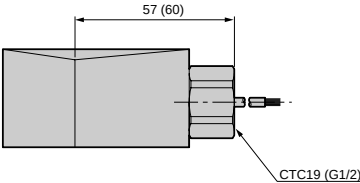
- Open frame lead wire
ADK11-8A to 25A-^{*}

3A
4A
5A



- Open frame type + conduit
ADK11-8A to 25A-^{*}

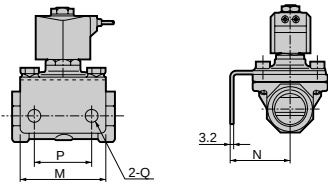
3A	G
4A	H
5A	



Dimensions shown in () are for G1/2.

- Mounting plate
ADK11-15A/20A/25A-^{***}

B



Model no.	M	N	P	Q
ADK11-15A- ^{***} B	56	45	40	ø9
ADK11-20A- ^{***} B	63	50	45	ø9
ADK11-25A- ^{***} B	75	56	50	ø11

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD

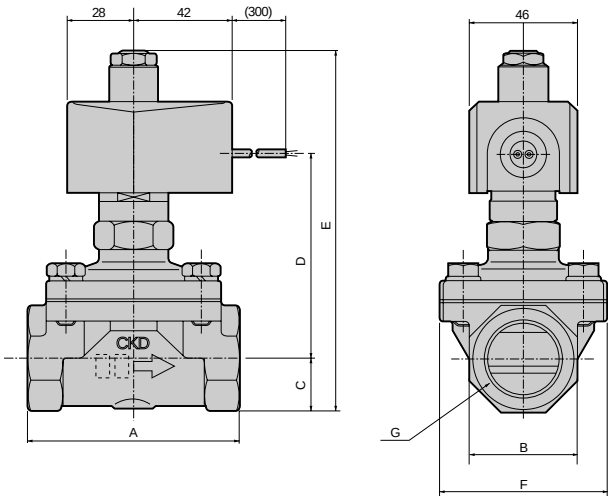
Medical
analysis

Custom
order

General purpose valve
Pilot kick type 2 port solenoid valve

Dimensions: ADK12 Series

- Open frame lead wire type
ADK12-15A/20A/25A-*3A



Note 1: The dimensions are the same for the G or NPT thread port size.

Model no.	A	B	C	D	E	F	G
ADK12-15A-03A	71	27 (29)	14.5	77	134.5	50	Rc1/2
ADK12-20A-03A	80	32 (35)	17.5	80.5	141	60	Rc3/4
ADK12-25A-03A	90	41 (45)	22.5	86	151.5	71	Rc1

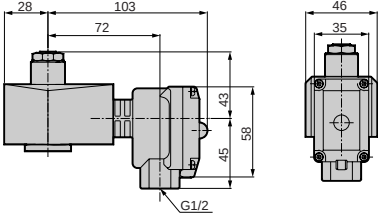
Optional dimensions: ADK12 Series



* Refer to the open frame lead wire type dimensions on the left page for common dimensions.

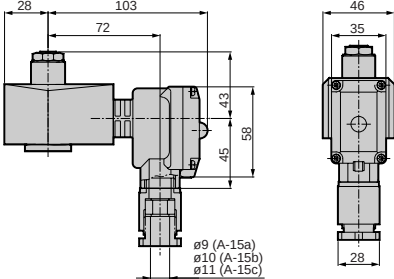
- Open frame type + HP terminal box
ADK12-15A/20A/25A-*

3	M
5	N
	I
	J



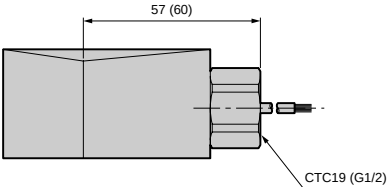
- Open frame type + cable gland
ADK12-15A/20A/25A-*

3	M	D
4	N	E
5		F



- Open frame type + conduit
ADK12-15A/20A/25A-*

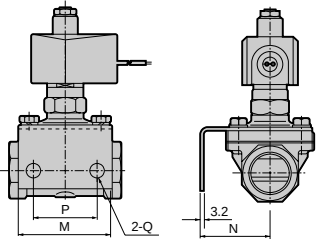
3	A	G
4	A	H
5	A	



Dimensions shown in () are for G1/2.

- Mounting plate
ADK12-15A/20A/25A-***

B



Model no.	M	N	P	Q
ADK12-15A-***B	56	45	40	ø9
ADK12-20A-***B	63	50	45	ø9
ADK12-25A-***B	75	56	50	ø11

HNB/G

USB/G

FAB/G

FGB/G

FVB

FWB/G

FHB

FLB

AB

AG

AP/
AD

APK/
ADK

For
dry air

Explosion
proof

HVB/
HVL

SAB/
SVB

NP/NAP/
NVP

CHB/G

MXB/G

Other G.P.
systems

PD/FAD/
PJ

CVE/
CVSE

CPE/
CPD

Medical
analysis

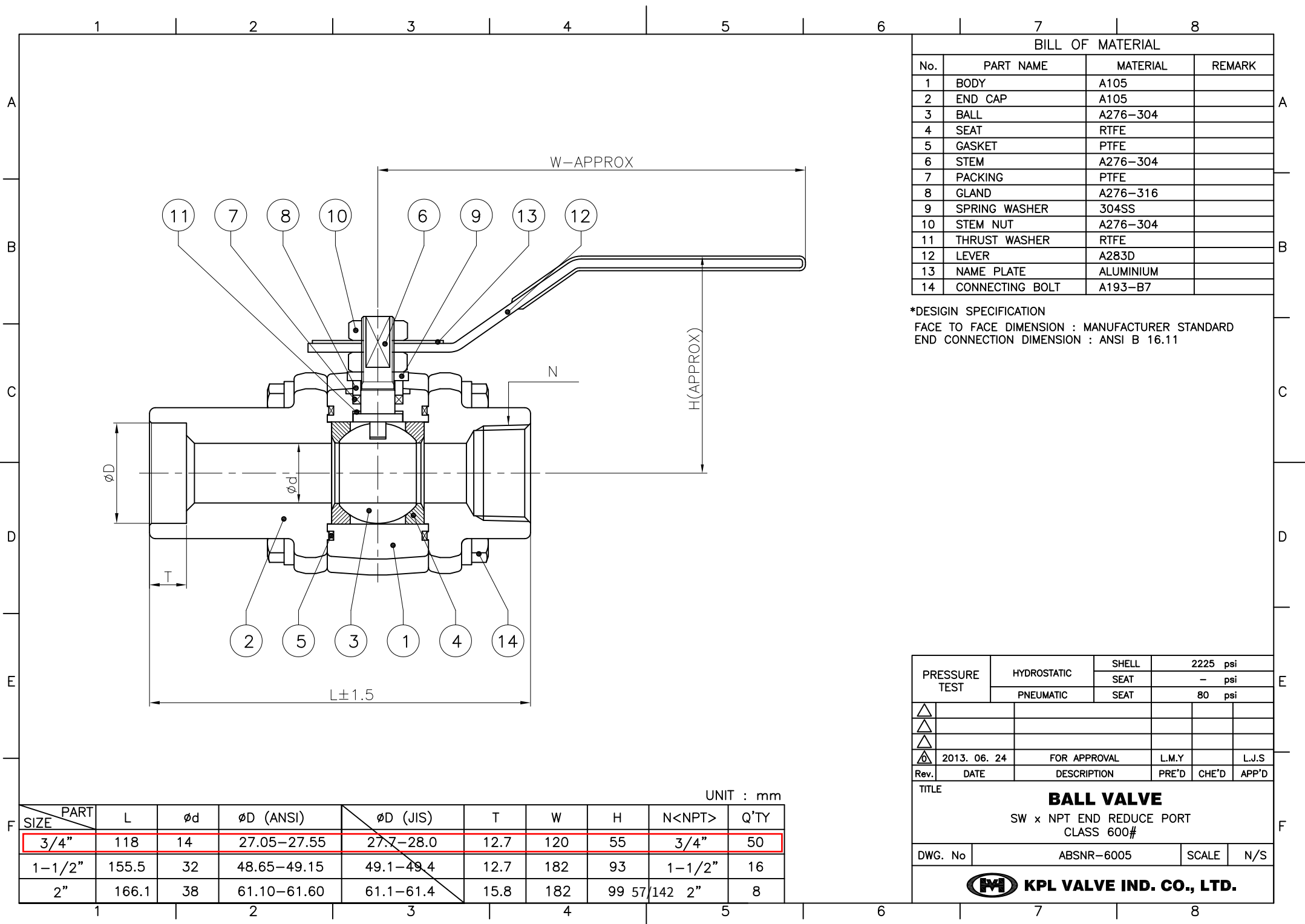
Custom
order

General purpose valve
Pilot kick type 2 port solenoid valve

Ball Valve

DRAWING LIST

[illegible]



BILL OF MATERIAL			
No.	PART NAME	MATERIAL	REMARK
1	BODY	A105	
2	END CAP	A105	
3	BALL	A276-304	
4	SEAT	RTFE	
5	GASKET	PTFE	
6	STEM	A276-304	
7	PACKING	PTFE	
8	GLAND	A276-316	
9	SPRING WASHER	304SS	
10	STEM NUT	A276-304	
11	THRUST WASHER	RTFE	
12	LEVER	A283D	
13	NAME PLATE	ALUMINIUM	
14	CONNECTING BOLT	A193-B7	

*DESIGN SPECIFICATION
FACE TO FACE DIMENSION : MANUFACTURER STANDARD
END CONNECTION DIMENSION : ANSI B 16.11

PRESSURE TEST	HYDROSTATIC	SHELL	2225 psi		
		SEAT	- psi		
	PNEUMATIC	SEAT	80 psi		
△					
△					
△					
△	2013. 06. 24	FOR APPROVAL	L.M.Y		L.J.S
Rev.	DATE	DESCRIPTION	PRE'D	CHE'D	APP'D

TITLE				
BALL VALVE				
SW x NPT END REDUCE PORT CLASS 600#				
DWG. No	ABSNR-6005			SCALE N/S
 KPL VALVE IND. CO., LTD.				

PART		L	ød	øD (ANSI)	øD (JIS)	T	W	H	N<NPT>	Q'TY
SIZE										
3/4"		118	14	27.05-27.55	27.7-28.0	12.7	120	55	3/4"	50
1-1/2"		155.5	32	48.65-49.15	49.1-49.4	12.7	182	93	1-1/2"	16
2"		166.1	38	61.10-61.60	61.1-61.4	15.8	182	99 57/142	2"	8

UNIT : mm

GENERAL INFORMATION

The KPL Ball Valves reflect many years of manufacturing and field testing based on accepted design criteria and sound engineering practices. You can rely on these ball valves to provide dependable, low cost, safe operation with which the name KPL has been associated for nearly 20 years throughout the process piping industry.



TECHNICAL FEATURES

1. DESIGN

Floating Ball Valves are manufactured in the main types ; One piece End Entry Type.

Two piece Screwed and Bolted Construction.

Three piece Bolted Construction. Valves can be supplied Full or Reduced Bore and manufactured in forged construction. Bolted and Screwed Body connections give of service and maintenance on site.

Valves can be supplied with either Raised Face, Ring Type Joint, Socketweld or Screwed End connections. Pressure rating is from ANSI 150 thru ANSI 2500.

Higher pressures can be supplied on request. Valves are supplied with Lever.

2. MATERIAL SELECTION

Valves are manufactured in a range of materials such as Carbon steel, Low Temp Carbon steel, Stainless steel, Duplex, Super Duplex, Monel, Titanium, Inconel and other Special Alloys.

3. BODY/CONNECTOR SEAL

Graphite ring, O-ring or PTFE seals guarantee perfect sealing between Body and Connector.

The Graphite ring continues to provide a seal in the event of a fire. O-ring can be supplied suitable for AED applications.

4. SEAT

Valves seat design gives perfect seal with various materials in both high and low pressure applications.

5. STEM

Stems are manufactured separately from the Ball and incorporate O-ring, Graphite ring, RTFE ring and Anti-Static devices.

6. MAINTENANCE

6.1 O-RING SEAT-RING Reneual Method

2-PC Body Ball valve

- a. Break end connector loose with wrench.
- b. Disassemble the body and the connector.
- c. Disassemble o-ring, seat-ring, ball and seat ring in order.
- d. Place new o-ring and seat ring then reassemble.
- e. Assemble the body and the connector.
- f. Tighten end connector into body.
- g. Test according to regulated pressure.

3-PC Body Ball valve

- a. Remove three pairs of bolts with the exception of one pair which remain in position but loosened. Turn and separate body from connector.
- b. Remove the body seals, seat-rings.
- c. Clean a contact area of body and connector and place new seals and seat-rings.

TECHNICAL FEATURES

- d. Turn the body the other way and tighten connector bolts to reassemble at this point.
- e. Test according to regulated pressure.

6.2 GLAND PACKING Renewal Method

- a. Disassemble Stem Nut, Name Plate, Lever, Stop Pin, and Disc Spring, Gland in order and then remove Gland Packing.
- b. Clean the parts and install new Gland Packing.
- c. Reassemble the parts.
- d. Turn the Lever and check the operating condition.
- e. Test according to regulated pressure.

7. TEST

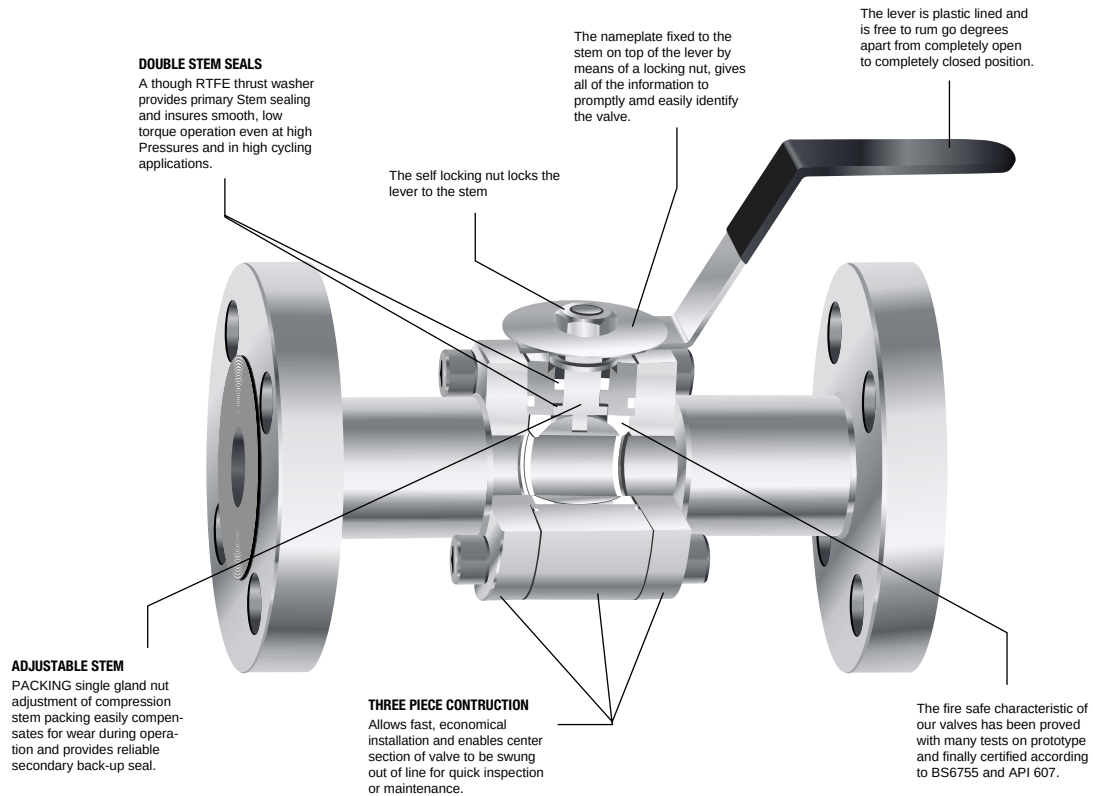
Valves are tested in accordance with BS 6755 Pt 1, API 6D, API 598 and ASME B16.34.

Valves should be Inspected by regulated pressure whether there is any leakage or not, after valves are fabricated and installed.

8. ACCESSORIES

Include locking device, pipe pups, extended bonnet and actuators. Suitable materials, components seats and o-ring can be supplied for valves with explosive decompression or Cryogenic applications.

CONSTRUCTION AND FEATURES



CONSTRUCTION TO BS5351

Our KPL ball valves have been designed fully in accordance with the requirements of BS5351

FULL AND REDUCED BORE

The valves are manufactured in sizes ranging from 3/8"(10mm) through 2"(50mm) and pressure rating at ANSI 150 and 2500LB for both the full bore and reduced bore version.

The ends are threaded NPT or socket weld.

FLOATING BALL

The floating ball is pressed against the seat by the pressure of the medium in the line.

The greater is the pressure the tighter is the contact.

Pressures and temperatures allowable by each type on the graph pressure temperature limits.

BUBBLE TIGHT SEALING MECHANISM

Floating ball design support the ball with two rigid RTFE seats placed in the valve body, one on the upstream pressure pushes the ball, which compresses the down stream side seat to completely shut off fluid flow.

ANTI BLOWOUT STEM

A design ensures the valve stem cannot be blown out of the body in the even of the gland being remove while the valve is under pressure.

FIRE SAFETY

API 607 is internationally recognized as the official standards for defining fire safe testing procedures and evaluation. The fire safe characteristic of our valves has been proved with many test on prototypes and finally certified according to API 607.

BALL VENT

The optional upstream relief hole in the zone of ball and body cavity will relieve excess pressure upstream and preserve the integrity of valve with preventing possible seat damage.

ANTI-STATIC DEVICE

If the fluid handled by the valve is flammable, the valve must be provided with an anti-static device which achieves electrical continuity between the ball stem and the valve body.

TESTING TO BS6755 AND API 598

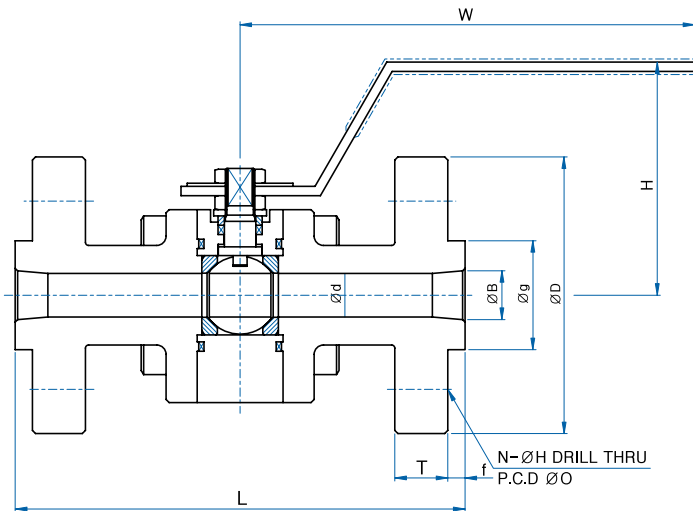
The hydrotests for seat sealing and body sealing are carried out respectively at 110% and 150% of the rated cold working pressure.

Low pressure seat test is carried out at 80 psi with dry air.

The hydrotest seat pressure shall not exceed the seat rating.

KPL 600# FLOATING BALL VALVE

Integral RF Flanged Ends, Full and Reduce Bore.



KPL STANDARD COMPONENT MATERIAL

NO	DESCRIPTION	CARBON STEEL	STAINLESS STEEL		
		A105	F304	F316	F316L
1	BODY	A105	A182-F304	A182-F316	A182-F316L
2	CONNECTOR	A105	A182-F304	A182-F316	A182-F316L
3	BALL	Stainless Steel A276-T316			A182-F316L
4	STEM	Stainless Steel A276-T316			A276-T316L
5	SEAT-RING	RTFE - Teflon / 15% Glass Fiber Filled RTFE - Teflon / 25% Carbon Fiber Filled			
6	GASKET	O-RING, PTFE(TEFLON), GRAPHITE			
7	PACKING	PTFE(TEFLON), GRAPHITE			
8	THRUST SEAL	RTFE - 25% Carbon Fiber Filled			
9	DISC SPRING	Carbon Steel A283D, Stainless Steel			
10	GLAND	Stainless Steel A276-T316			
11	LEVER	A283D	Stainless Steel		
12	STEM NUT	Stainless Steel A276-T304			
13	NAME PLATE	ALUMINUM	Stainless Steel		
14	CONNECTOR BOLT	A193-B7	A193-B8		
15	STOP PIN	Stainless Steel A276-T304			

SPECIFICATION

Valve Body Pressure Rating

ANSI Class 600, Max 1440 psig @ 100° F

Temperature Rating

-20° F to 450° F, Max 450° F @ 100 psig.
Dependent upon seal & seat choice.

Body and End Piece

Three-piece construction.
Available in stainless or carbon steel.

Body Bolts & Nuts

ASTM A193 Gr B7(B8) or ASTM A194 Gr 2H(B8)
Other Bolts are available according to body material.

Ball and Stem

316 stainless steel, balls are solid of forged or cast.

Seats

Reinforced PTFE seats.
Other seats are available, consult KPL Valve.

Body Seal and Stem Packing

PTFE as standard.
Other packings are available, consult KPL Valve.

Operation

Valves are supplied with handle operator.
A locking device or pneumatic and electric automation optionally available.

Seat / Seal Leakage

Conform to API 598 or ANSI B 16.34 or BS6755.
All valves are tested to bubble-tight standards.

Design Specification

ANSI B 16.34
BS 5351
API 6D
Face to face dimension - ANSI B 16.10
Flange dimension - ANSI B 16.5
BS 5251, NACE MR-01-75, and API 607 (BS6755) optionally available.

※ Monel, titanium, hastelloy C and other special materials are available to customer spec.

※ Fire safe or Anti-static are optional.

TEST PRESSURE

(psi)

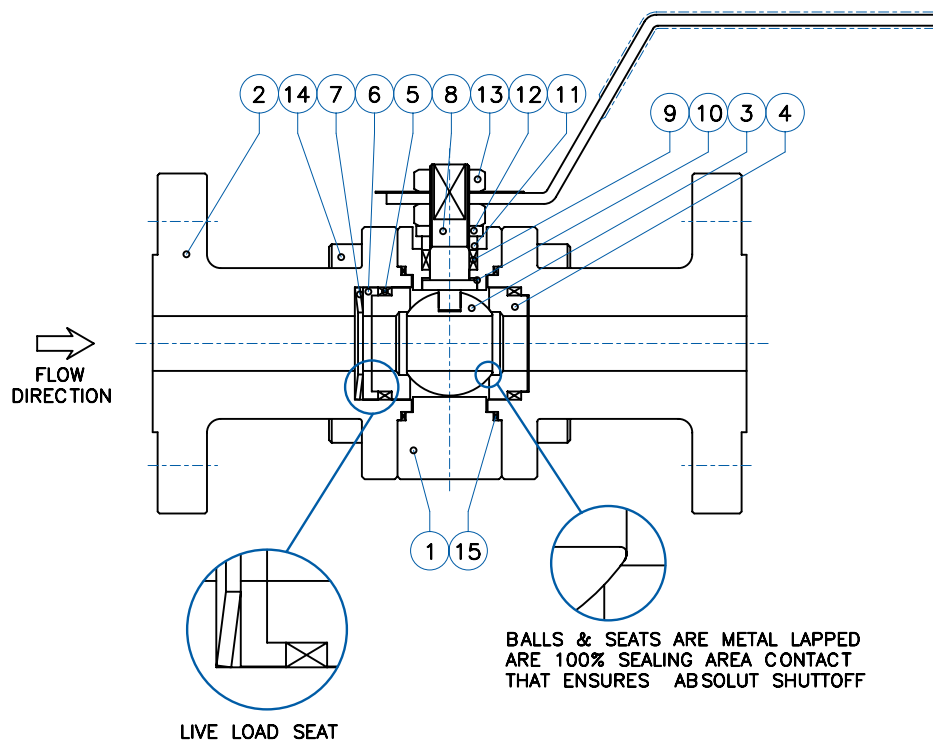
Max. Working pressure	Shell (Hydro)	Seats	
		Hydro	Pneu
1440	2175	1600	80

※ Body & seat rating given in above conform to API 598

DIMENSION TABLE

SIZE	DIMENSION(UNIT - mm)											Approx Weight(kg)
	L	d	D	g	T	f	B	N- Ø H	O	H	W	
1/2" × 3/8"	165	11	95.3	35	14.2	6.4	15.7	4-16	66.5	79	168	3.4
1/2" × 1/2"	165	14	95.3	35	14.2	6.4	15.7	4-16	66.5	84	168	4.1
3/4" × 1/2"	190	14	117.4	43	15.7	6.4	20.8	4-19	82.6	84	168	5.7
3/4" × 3/4"	190	20.5	117.4	43	15.7	6.4	20.8	4-19	82.6	97	180	6.1
1" × 3/4"	216	20.5	124	51	17.5	6.4	26.7	4-19	88.9	97	180	7.2
1" × 1"	216	25	124	51	17.5	6.4	26.7	4-19	88.9	119	198	8.0
1 1/4" × 1"	229	25	133.4	63.5	20.6	6.4	35	4-19	98.6	119	198	9.4
1 1/4" × 1 1/4"	229	32	133.4	63.5	20.6	6.4	35	4-19	98.6	123	198	11.2
1 1/2" × 1 1/4"	241	32	155.5	73	22.4	6.4	40.9	4-22	114.3	123	198	15.5
1 1/2" × 1 1/2"	241	38	155.5	73	22.4	6.4	40.9	4-22	114.3	128	198	17.6
2" × 1 1/2"	292	38	165	92	25.4	6.4	52.6	8-19	127	128	198	20
2" × 2"	292	50	165	92	25.4	6.4	52.6	8-19	127	131	280	25

KPL METAL SEATED BALL VAVES



No.	PART
1	BODY
2	CONNECTOR
3	BALL
4	SEAT
5	SEAT SEAL
6	SEAT RETAINER
7	SEAT OLAD SPRING
8	STEM
9	PACKING
10	THRUST WASHER
11	GLAND
12	DISC SPRING
13	NUT
14	BOLT
15	BODY GASKET

APPLIC ATIONS

- * Liquids, gas and steam
- * Chemical and petrochemical plants
- * Oil and Gas prucduction
- * Power plants

PRESSURER ATINGS

- * Ansi Class 150,300,600

SIZE RANGE

- * 1/2" - 2"

TEMPERATURE RANGE

- * -50c ~ 400c. Conxult KPL valve
for higher temperature applications

AVAILABLE END CONNECTIONS

- * socket weld, Thread end, Flange End.
- * Per customer specification

MATERIALS

- * Body, Connector : Crbon & Stainless steel
- * Ball : 316 + hard chrom plating.
- * Seats : 316 + solid stelite6
- * Packing, Seat seals : Graphite

VALVE TIGHTNESS

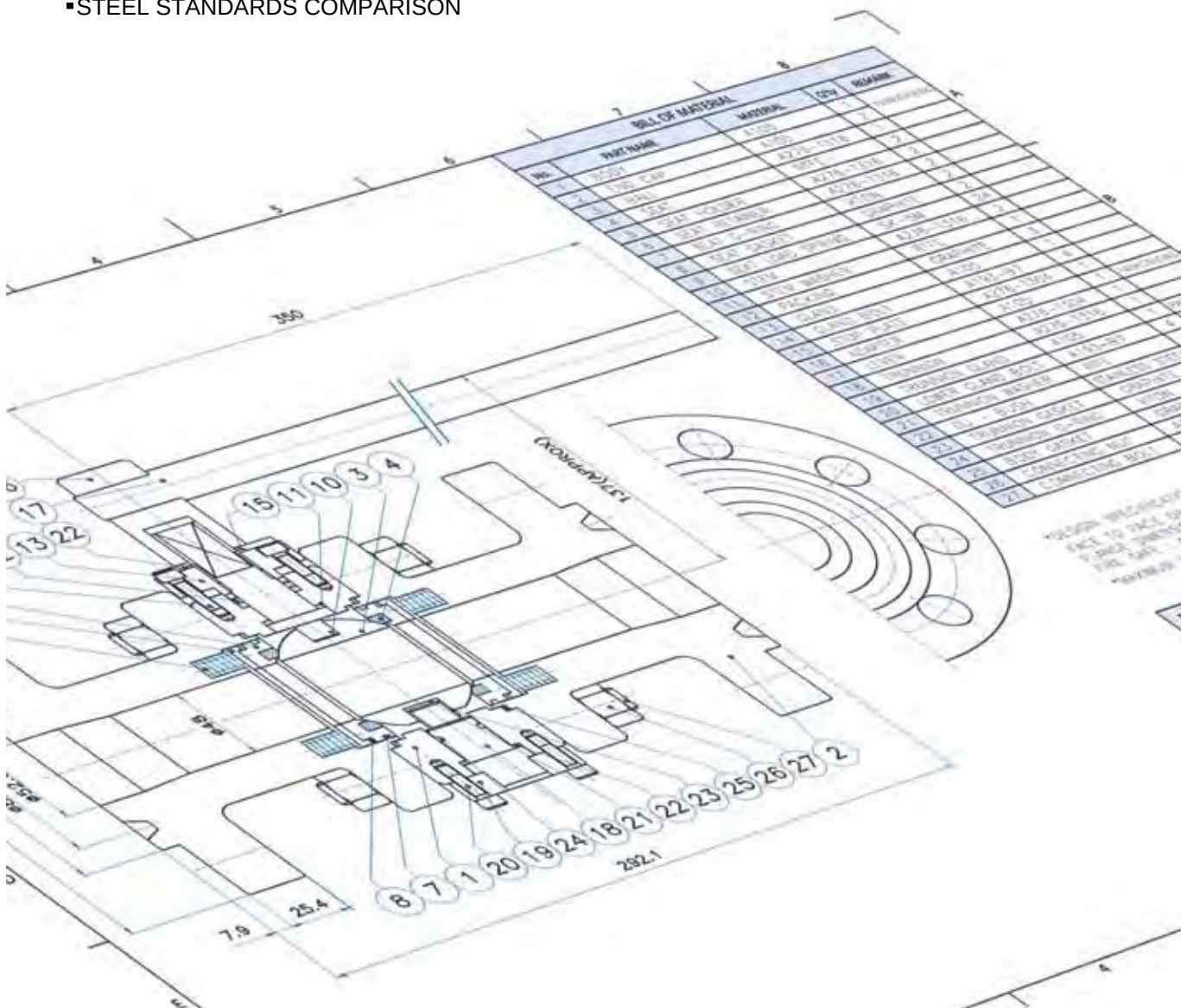
- * API 598. ANSI/FCI 70-2 Class V

OPERATOR

- * Manual, pneumatic or elactric actuator

ENGINEERING DATA

- CONFORMANCE STANDARDS
- PRESSURE / TEMPERATURE
- Cv COEFFICIENT / FLOW CHART / TORQUE
- LIST OF MATERIAL SPECIFICATIONS - ASME / ANSI B16.34
- PRESSURE - TEMPERATURE RATINGS FOR STANDARD CLASS VALVES - ASME / ANSI B16.34
- CONVERSION CHART
- STEEL STANDARDS COMPARISON



CONFORMANCE STANDARDS

KPL Ball valves conform to the following standards and KPL is able to apply any other standard specified by the customer.

■ AMERICAN STANDARDS

ANSI B 16.5	- Pipe flanges and flanged fittings.
B 16.10	- Face - to -face and end - to - end dimension of valves.
B 16.25	- Butt -weld ends.
B 16.34	- Valves -flanged, thread and weld ends.
B 1.20.1	- Pipe threads, general purpose(inch).
B 31.3	- Chemical plant and petroleum refinery piping.
B 31.4	- Liquid transportation system for hydrocarbons.
	- Liquid petroleum gas, Anhydrous ammonia and alcohols.
B 31.8	- Gas transmission and distribution system.
ASTM	- Material specifications of material used.
ASME	- Boilers and pressure vessel code, sections V , VIII, IX
API SPEC Q1	- Specification for quality programs.
SPEC 6D	- Specification for pipeline valves. (Steel gate, Plug, ball and Check valves)
SPEC 6FA	- Specification for fire test for valves.
Std 607	- Fire test for soft - seated quarter - turn valves.
Std 598	- Valve inspection and testing.
SPEC 5L	- Specification for line pipe.
SPEC RP6F	- Recommended practice for fire test for valves.
MSS SP -6	- Standard finishes for contact of pipe flanges and connecting, end flanges of valves.
SP -25	- Standard marking system for valves, fittings, flanges and unions.
SP -44	- Steel pipeline flanges.
SP -53	- Magnetic particle examination method.
SP -54	- Visual method.
SP -72	- Ball valves with flange or butt-weld ends for general service.
SP -61	- Pressure testing of steel valves.
SP -82	- Valves pressure testing method.
SSPC,SP1-10	- Surface preparation specification.

■ INTERNATIONAL STANDARDS

ISO 9001	- Quality system. model of quality assurance in design, development, production, installation and servicing.
ISO 5211	- Part -turn valve actuator attachment.
7121	- Flanged steel ball valves.
EN 10204	- Type of inspections documents.
NACE -MR-01-75	- Sulfide stress cracking resistant materials.

■ BRITISH STANDARDS

BS 1560	- Circular flanges for pipes, flange and fittings.
BS 20.8	- Face to face, center -to-center, end - to - end and center - to end dimensions of valves.
BS 5146	- Inspection and tests of valves.
BS 5351	- Steel ball valves for the petroleum, petrochemical and allied instrument.
BS 6755 PT2	- Testing of valves. Specification for fire-type testing requirements.

■ GERMAN STANDARDS

DIN 1690	- Technical delivery conditions for casting of metallic materials.
2505	- Calculation of flange joints.
2544-48	- Cast steel flanges.
2526	- Finishing of flange packing surfaces.
3202	- Face -to -face dimension of flange valves.
3230	- Bodies of valves, calculation.
DIN XXXX	- Material specifications of materials used.

■ JIS / KS

JIS B 2002	- Face to face and end to end dimension of valve.
JIS B 2003	- General rules for inspection of valves.
JIS B 2220	- Steel welding pipe flanges.
KS B 2304	- Ball valve.
KS B 2308	- Korea standard flanged ball valves.

PRESSURE/TEMPERATURE

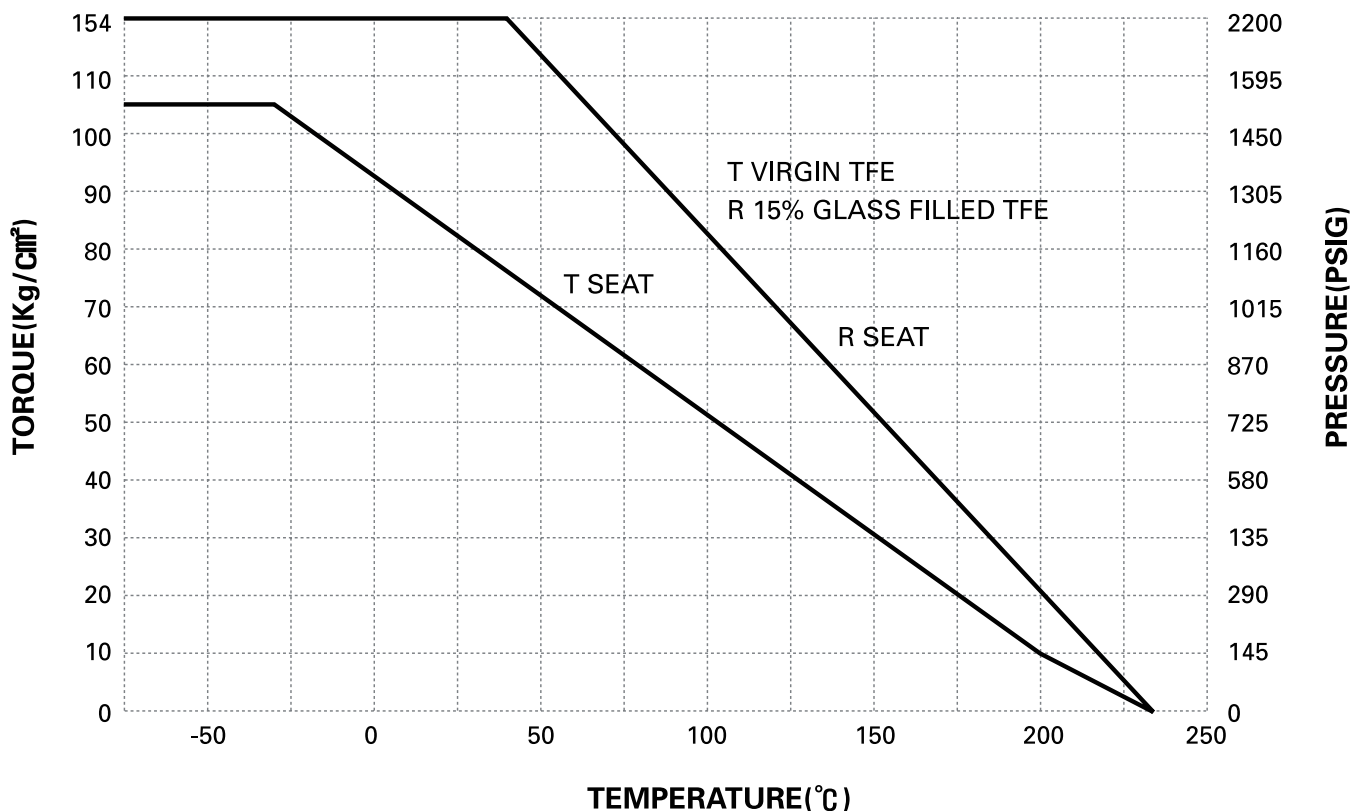
Technical Data

Pressure@ Maximum Temperature	Seat Material	Pressure Rating -20° F to -100° F (-29° C to 38° C)
100PSI@ 450° F (232° C)	Virgin TFE	2200 PSIG
250PSI@ 250° F (121° C)	Polyethylene	
100PSI@ 450° F (232° C)	Carbon/Glass TFE	

Working Pressure in PSIG

Seat Material	Virgin TFE	15% Glass Filled TFE
Temperature@Pressure (PSIG)		
100° F (38° C)	2200	2200
200° F (93° C)	1500	1600
300° F (148° C)	800	900
400° F (204° C)	600	245
500° F (232° C)	100	175

Reinforced TFE Seats



Cv COEFFICIENT/FLOW CHART/TORQUE

BALL VALVE Cv COEFFICIENT

Cv coefficient is rate of flow in gallons per minute at 60° F water with pressure drop of 1 psig a given opening.

$$Q = C_v \sqrt{\frac{\Delta P}{G}}$$

Q : Flow rate (US Gallons/min)

ΔP : Pressure drop (psi)

G : Specific gravity

Q_l (m³/h) : Liquid rate
 Q_g (m³/h) : Gas flow rate at 760mmHg and temperature 15°C
 Q_s (Kg/h) : Steam flow rate
 P₁ (Kg/cm²) : Absolute inlet pressure
 P₂ (Kg/cm²) : Absolute outlet pressure

P_m (Kg/cm²) : (P₁ + P₂) / 2 = Absolute pressure
 K : Revised factor of viscosity
 h (Kg/cm²) = P₁ + P₂ : Pressure drop
 t (°C) : Flowing temperature
 G_l (m³/h) : Liquid specific gravity (air=1)
 s (°C) : Steam superheat

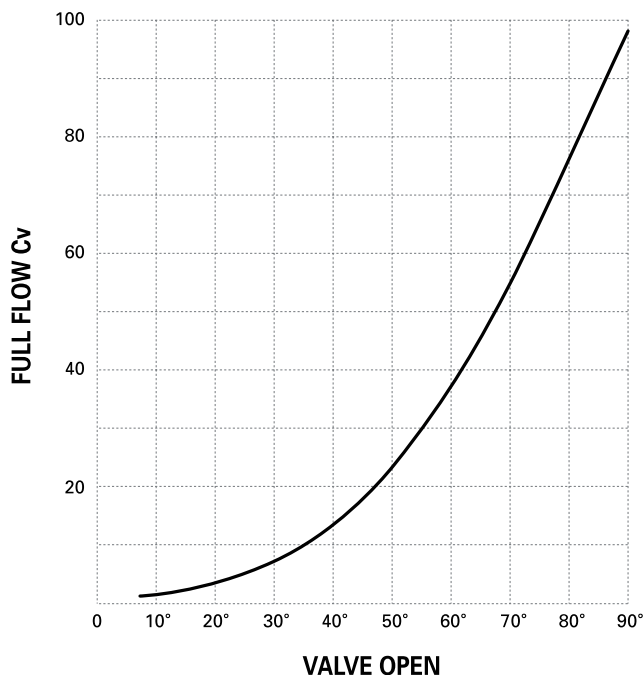
For gas and steam : Max. H = 1/2 P₁, Min. P₂ = 1/2 P₁

FOR LIQUID
$Q_l = \frac{0.8547 \cdot C_v \cdot \sqrt{h}}{K \sqrt{G_l}}$
FOR GAS
$Q_g = \frac{4047 \cdot C_v \cdot \sqrt{h \cdot p_m}}{\sqrt{G_g(273+t)}}$
FOR STEAM
$Q_s = \frac{19.4 \cdot C_v \cdot \sqrt{p_2 \cdot h}}{\sqrt{(1 + 0.0013S)}}$

G _l : LIQUID SPECIFIC GRAVITY						G _g : GAS SPECIFIC GRAVITY					
Alcohols	0.8	Gasolin	0.80~0.83	Sulfuric acid	1.84	Acetylene	0.907	Ethylene	0.974	Nitrogen	0.967
Ammonia	0.89	Kerosene	0.76~0.80			Ammonia	0.596	Hydrogen	0.069	Oxygen	1.105
Benzen	0.70~0.76	Lubricant oil	0.90~0.96			Butane	2.009	Methane	0.554	Propan	1.562
Ether	0.73	Sea water	1.01~1.05			Chiorine	2.486	Natural gas	0.570		

FLOW CHARACTERISTIC

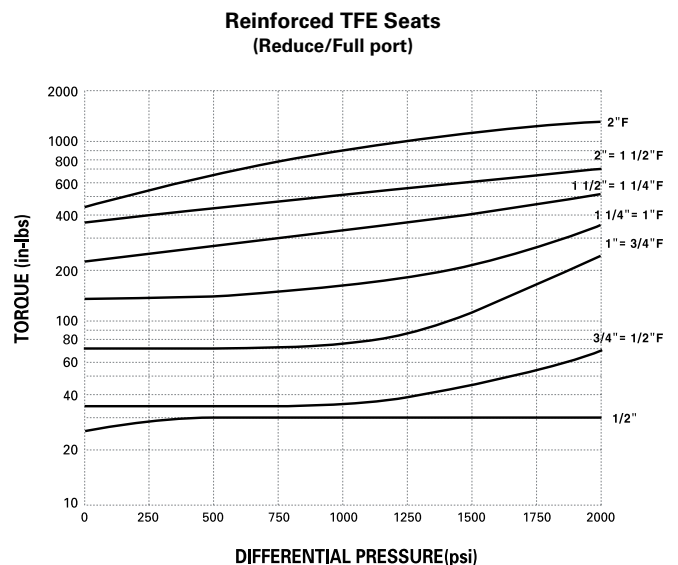
Flow characteristic of ball valve is shown on the diagram by flow Cv(%) and valve open(deg.)



TORQUE

The following chart is shown by average torque data as per each size of approximate 100pcs samples. According to actual fluid & service condition, it should have 20% tolerance.

So, actual torque for actuator add to a safety factor 60% in value shown on data.



LIST OF MATERIAL SPECIFICATIONS - ASME/ANSI B16.34

Applicable ASTM Specification

Material Group No.	Normal Designation	Forgings Spec.-Grade Notes	Castings Spec.-Grade Notes	Tubular Products Spec.-Grade Notes
1.1	Carbon	A 105 (1) (2) A 350 - LF2	A 216 - WCB (1)	A 672 - B 70 A 672 - V 70
1.10	21/4 Cr - Mo	A 182 - F 22 (4)	A 217 - WC 9 (3) (5)	
2.1	18 Cr - 8 Ni	A 182 - F 304 (7) A 182 - F 304H	A 351 - CF 3 (8) A 351 - CF 8 (7)	A 312 - TP 304 (7) A 312 - TP 304H A 358 - 304 (7) A 376 - TP 304H A 430 - FP 304 (7) A 430 - FP 304H
2.2	16 Cr - 12 Ni - 2 Mo	A 182 - F 316 A 182 - F 304H		A 312 - TP 316(7) A312 - TP 316H A 358 - 316 (7) A 312 - TP 316 (7) A376 - TP 316H A 430 - FP 316 (7) (9) A 430 - FP 316H
	18 Cr - 8 Ni		A 351 - CF 3A (10)	A 351 - CF 8A (10)
	18 Cr - 13 Ni - 3 Mo			A 312 - TP 317(7)
	18 Cr - 9 Ni - 2 Mo		A 351 - CF 3M (11) A 351 - CF 8M (7)	
2.3	18 Cr - 8 Ni	A 182 - F 304L		A 312 - TP 304L (8)
	16 Cr - 12 Ni - 2 Mo	A 182 - F 316L		A 312 - TP 316L
2.8	22 Cr - 5 Ni - 3 Mo - N	A 182 - F 51		A 789 - S 31803 A 790 - S 31803

NOTES :

- (1) Upon prolonged exposure to temperatures above 800 °F (425 °C), the carbide phase of carbon steel may be converted to graphite.
- (2) Only killed steel shall be used above 850 °F (455 °C)
- (3) Use normalized and tempered material only.
- (4) Permissible, but not recommended for prolonged usage above about 1100 °F(595 °C)
- (5) Not to be used over 1100 °F (595 °C)
- (7) At temperatures over 1000 °F (540 °C), use only when the carbon is 0.04% or higher.
- (8) Not to be used over 800 °F (425 °C)
- (9) For temperatures above 1000 °C (540 °C), use only if the material is heat treated by heating it to a minimum temperature of 1900 °F (1040 °C) and quenching in water or rapidly cooling by other means.
- (10) Not to be used over 650 °F (345 °C)
- (11) Not to be used over 850 °F (455 °C)

PRESSURE - TEMPERATURE RATINGS FOR STANDARD CLASS VALVES - ASME/ANSI B16.34

Ratings for Group 1.1 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi					
	150	300	600	900	1500	2500
-20 to 100	285	740	1,480	2,220	3,705	6,170
200	260	675	1,350	2,025	3,375	5,625
300	230	655	1,315	1,970	3,280	5,470
400	200	635	1,270	1,900	3,170	5,280
500	170	600	1,200	1,795	2,995	4,990
600	140	550	1,095	1,640	2,735	4,560
650	125	535	1,075	1,610	2,685	4,475
700	110	535	1,065	1,600	2,665	4,440
750	95	505	1,010	1,510	2,520	4,200
800	80	410	825	1,235	2,060	3,430
850	65	270	535	805	1,340	2,230
900	50	170	345	515	860	1,430
950	35	105	205	310	515	860
1000	20	20	105	155	260	430

Ratings for Group 1.10 Materials

(°F/psi)

Temperature, °F	Working Pressure by Classes, psi					
	150	300	600	900	1500	2500
-20 to 100	290	750	1,500	2,250	3,750	6,250
200	260	750	1,500	2,250	3,750	6,250
300	230	730	1,455	2,185	3,640	6,070
400	200	705	1,410	2,115	3,530	5,880
500	170	665	1,330	1,995	3,325	5,540
600	140	605	1,210	1,815	3,025	5,040
650	125	590	1,175	1,765	2,940	4,905
700	110	570	1,135	1,705	2,840	4,730
750	95	530	1,065	1,595	2,660	4,430
800	80	510	1,015	1,525	2,540	4,230
850	65	485	975	1,460	2,435	4,060
900	50	450	900	1,350	2,245	3,745
950	35	375	755	1,130	1,885	3,145
1000	20	260	520	780	1,305	2,170
1050	20(1)	175	350	525	875	1,455
1100	20(1)	110	220	330	550	915
1150	20(1)	70	135	205	345	570
1200	20(1)	40	80	125	205	345

PRESSURE - TEMPERATURE RATINGS[CON.D]

Ratings for Group 2.1 Materials (°F/psi)

Temperature, °F	Working Pressure by Classes, psi					
	150	300	600	900	1500	2500
-20 to 100	275	720	1,440	2,160	3,600	6,000
200	230	600	1,200	1,800	3,000	5,000
300	205	540	1,055	1,585	2,640	4,400
400	190	495	940	1,410	2,350	3,920
500	170	485	875	1,310	2,185	3,640
600	140	435	830	1,245	2,075	3,460
650	125	430	815	1,225	2,040	3,400
700	110	425	805	1,210	2,015	3,360
750	95	425	795	1,195	1,990	3,320
800	80	405	790	1,180	1,970	3,280
850	65	395	780	1,165	1,945	3,240
900	50	390	770	1,150	1,920	3,200
950	35	380	750	1,125	1,870	3,120
1000	20	320	645	965	1,610	2,685
1050	20(1)		620	925	1,545	2,570
1100	20(1)	255	515	770	1,285	2,145
1150	20(1)	200	390	585	980	1,630
1200	20(1)	155	310	465	770	1,285
1250	20(1)	115	220	330	550	915
1300	20(1)	85	165	245	410	685
1350	20(1)	60	125	185	310	515
1400	20(1)	50	95	145	240	400
1450	20(1)	35	70	105	170	285
1500	20(1)	25	50	70	120	120

NOTES :

- (1) All pressures are given as gage pressure.
- (2) Pressure in kg/cm² are shown for convenience.
- (3) Material groups are as listed in page 32.
- (4) For temperature limitations, see footnotes on page 32.

Ratings for Group 2.3 Materials (°F/psi)

Temperature, °F	Working Pressure by Classes, psi					
	150	300	600	900	1500	2500
-20 to 100	230	600	1,200	1,800	3,000	5,000
200	195	505	1,015	1,520	2,530	4,220
300	175	455	910	1,360	2,270	3,780
400	160	415	825	1,240	2,065	3,440
500	145	380	765	1,145	1,910	3,180
600	140	360	720	1,080	1,800	3,000
650	125	350	700	1,050	1,750	2,920
700	110	345	685	1,030	1,715	2,880
750	95	335	670	1,010	1,680	2,800
800	80	330	660	985	1,645	2,740
850	65	320	645	965	1,610	2,680

NOTES :

- (1) All pressures are given as gage pressure.
- (2) Pressure in kg/cm² are shown for convenience.
- (3) Material groups are as listed in page 32.
- (4) For temperature limitations, see footnotes on page 32.

Ratings for Group 2.2 Materials (°F/psi)

Temperature, °F	Working Pressure by Classes, psi					
	150	300	600	900	a1500	2500
-20 to 100	275	720	1,440	2,160	3,600	6,000
200	235	620	1,240	1,860	3,095	5,160
300	215	560	1,120	1,680	2,795	4,660
400	195	515	1,025	1,540	2,570	4,280
500	170	480	955	1,435	2,390	3,980
600	140	450	900	1,355	2,255	3,760
650	125	445	890	1,330	2,220	3,700
700	110	430	870	1,305	2,170	3,620
750	95	425	855	1,280	2,135	3,560
800	80	420	845	1,265	2,110	3,520
850	65	420	835	1,255	2,090	3,480
900	50	415	830	1,245	2,075	3,460
950	35	385	775	1,160	1,930	3,220
1000	20	350	700	1,050	1,750	2,915
1050	20(1)	345	685	1,030	1,720	2,865
1100	20(1)	305	610	915	1,525	2,545
1150	20(1)	235	475	710	1,185	1,970
1200	20(1)	185	370	555	925	1,545
1250	20(1)	145	295	440	735	1,230
1300	20(1)	115	235	350	585	970
1350	20(1)	95	190	290	480	800
1400	20(1)	75	150	225	380	630
1450	20(1)	60	115	175	290	485
1500	20(1)	40	85	125	205	345

Ratings for Group 2.8 Materials (°F/psi)

Temperature, °F	Working Pressure by Classes, psi					
	150	300	600	900	1500	2500
-20 to 100	290	750	1,500	2,250	3,750	6,250
200	260	720	1,440	2,160	3,600	6,000
300	230	665	1,330	1,995	3,325	5,540
400	200	615	1,230	1,845	3,070	5,120
500	170	575	1,150	1,730	2,880	4,800
600	140	555	1,115	1,670	2,785	4,640
650	125	550	1,100	1,650	2,750	4,580
700	110	540	1,085	1,625	2,710	4,520
750	95	530	1,085	1,595	2,660	4,430

CONVERSION CHART

Degree Fahrenheit - Centigrade

general Formula : °F = $\frac{9}{5} \times \text{°C} + 32$

°C = $\frac{5}{9} (\text{°F} - 32)$

°C	⇌	°F	°C	⇌	°F	°C	⇌	°F	°C	⇌	°F	°C	⇌	°F
-169	-273	-495.4	4.4	40	104	179	355	671	354	670	1238	529	985	1805
-168	-270	-454	7.2	45	113	182	360	680	357	675	1247	532	990	1814
-165	-265	-445	10.0	50	122	185	365	689	360	680	1256	525	995	1823
-162	-260	-436	12.8	55	131	188	370	698	363	685	1265	538	1000	1832
-159	-255	-427	15.6	60	140	191	375	707	366	690	1274	541	1005	1841
-157	-250	-418	18.3	65	149	193	380	716	368	695	1283	543	1010	1850
-154	-245	-409	21.1	70	158	196	385	725	371	700	1292	546	1015	1859
-151	-240	-400	23.9	75	167	199	390	734	374	705	1301	549	1020	1868
-148	-235	-391	26.7	80	176	202	395	743	377	710	1310	552	1025	1877
-146	-230	-382	29.4	85	185	204	400	752	379	715	1319	554	1030	1886
-143	-225	-373	32.2	90	194	207	405	761	382	720	1328	557	1035	1895
-140	-220	-364	35.0	95	203	210	410	770	385	725	1337	560	1040	1904
-137	-215	-355	37.8	100	212	213	415	779	388	730	1346	563	1045	1913
-134	-210	-346	40.6	105	221	216	420	788	391	735	1355	566	1050	1922
-132	-205	-337	43.3	110	230	218	425	797	393	740	1364	568	1055	1931
-129	-200	-328	46.1	115	239	221	430	806	396	745	1373	571	1060	1940
-126	-195	-319	48.9	120	248	224	435	815	399	750	1382	574	1065	1949
-123	-190	-310	51.7	125	257	227	440	824	402	755	1391	577	1070	1958
-121	-185	-301	54.4	130	266	229	445	833	404	760	1400	579	1075	1967
-118	-180	-292	57.2	135	275	232	450	842	407	765	1409	582	1080	1976
-115	-175	-283	60.0	140	284	235	455	851	410	770	1418	585	1085	1985
-112	-170	-274	62.8	145	293	238	460	860	413	775	1427	588	1090	1994
-109	-165	-265	65.6	150	302	241	465	869	416	780	1436	590	1095	2003
-107	-160	-258	68.3	155	311	243	470	878	418	785	1445	593	1100	2012
-104	-155	-247	71.1	160	320	246	475	887	421	790	1454	596	1105	2021
-101	-150	-238	73.9	165	329	249	480	896	424	795	1463	599	1110	2030
-98.3	-145	-229	76.7	170	338	252	485	905	427	800	1472	602	1115	2039
-95.6	-140	-220	79.4	175	347	254	490	914	429	805	1481	604	1120	2048
-92.8	-135	-211	82.2	180	356	257	495	923	432	810	1490	607	1125	2057
-90.0	-130	-202	85.0	185	365	260	500	932	435	815	1499	610	1130	2066
-87.2	-125	-193	87.8	190	374	266	505	950	438	820	1508	613	1135	2075
-84.4	-120	-184	90.6	195	383	263	540	941	441	825	1517	616	1140	2084
-81.6	-115	-175	93.3	200	392	268	515	959	443	830	1526	621	1150	2102
-78.9	-110	-166	96.1	205	401	271	520	968	446	835	1535	621	1150	2102
-76.1	-105	-157	98.9	210	410	274	525	977	449	840	1544	624	1155	2111
-73.3	-100	-148	102	215	419	277	530	986	452	845	1553	627	1160	2120
-70.6	-95	-139	104	220	428	279	535	995	454	850	1562	629	1165	2129
-67.8	-90	-130	107	225	427	282	540	1004	457	855	1571	632	1170	2138
-65.0	-85	-121	110	230	446	285	545	1013	460	860	1580	635	1175	2147
-62.2	-80	-112	113	235	455	288	550	1022	463	865	1589	638	1180	2156
-59.4	-75	-103	115	240	464	291	555	1031	466	870	1598	641	1185	2165
-56.7	-70	-94	118	245	473	293	560	1040	468	875	1607	643	1190	2174
-53.9	-65	-85	121	250	482	296	565	1049	471	880	1616	646	1195	2183
-51.1	-60	-76	124	255	491	199	570	1058	474	885	1625	649	1200	2192
-48.3	-55	-67	127	260	500	302	575	1067	577	890	1634	652	1205	2201
-45.6	-50	-58	129	265	509	304	580	1076	479	895	1643	654	1210	2210
-42.8	-45	-49	132	270	518	307	585	1085	482	-900	1652	657	1215	2219
-40.0	-40	-40	135	275	527	310	590	1094	485	905	1661	660	1220	2228
-37.2	-35	-31	138	280	536	313	595	1103	488	910	1670	663	1225	2237
-34.4	-30	-22	141	285	545	316	600	1112	491	915	1679	666	1230	2246
-31.7	-25	-13	143	290	554	318	605	1121	493	920	1688	668	1235	2255
-28.9	-20	-4	146	295	563	321	610	1130	496	925	1697	671	1240	2264
-26.1	-15	5	149	300	572	324	615	1139	499	930	1706	674	1245	2273
-23.3	-10	14	152	305	581	327	620	1148	502	935	1715	677	1250	2282
-20.6	-5	23	154	310	590	329	625	1157	504	940	1724	679	1255	2291
-17.8	0	32	157	315	599	332	630	1166	507	945	1733	682	1260	2300
-15.0	5	41	160	320	608	335	635	1175	510	950	1742	685	1265	2309
-12.2	10	50	163	325	617	338	640	1184	513	955	1751	688	1270	2318
-9.4	15	59	166	330	626	341	645	1193	516	960	1760	691	1275	2327
-6.7	20	68	168	335	635	343	650	1202	518	965	1769	693	1280	2336
-3.9	25	77	171	340	644	346	655	1211	521	970	1778	696	1285	2345
-1.1	30	86	174	345	653	349	660	1220	527	980	1796	702	1295	2363
1.7	35	95	177	350	662	352	665	1229	527	980	1796	702	1295	2363
												704	1300	2372

The central column represents the know temperature in °C or °F
The equivalent temperature in °F or °C is then read from the column to the right or the left.

STEEL STANDARDS COMPARISON

ASTM	UNS/AISI	DIN	AFNOR	BS	JIS
A105	AISI 1020	C22 1.0402	A48 - XC18S	1503-221-490(En 3A)	SF50 (SC30)-(S2BC)
A182 - F1	K12822	15 Mo 3 1.5415	-	1503-240-420	SFHV 12B - G 3213
- F5	K41545	12 CrMo 19.5 1.7362	Z 12CD 5	1503-625-520	SFHV 25 - G 3213
- F11	K11572	24 CrMoV-55 1.7733	15 CD 5.05	1506-661-440	SFHV 23B - G 3213
- F22	K21590	10 CrMo 9.10 1.7380	12 CD 9.10	1503-622-490	SFHV 24B - G 3213
- F304	S30400	X5 CrNi 18.9 1.4301	26 CN 18.09	1503-304-S15	SUS 304 - G 4303
- F304H	S30409	X5 CrNi 18.9 1.4301	26 CN 18.09	1503-304-S49	SUS 304H - G 4303
- F304L	S30403	X2 CrNi 18.9 1.4306	22 CN 18.10	1503-304-S12	SUS 304L - G 4303
- F316	S31600	X5 CrNiMo 18.10 1.4401	26 CND 17.11	1503-316-S16	SUS 316 - G 4303
- F316H	S31609	X5 CrNiMo 18.12	-	1503-316-S49	SUS 316H - G 4303
- F316L	S31603	X2 CrNiMo 18.10 1.4404	22 CND 17.12	1503-316-S12	SUS 316L - G 4303
- F321	S32100	X10 CrNiTi 18.9 1.4541	26 CNT 18.10	1503-321-S31	SUS 321
- F347	S34700	X10 CrNiNb 18.9 1.4550	26 CN Nb 18.10	1503-347-S17	SUS 347
A193 - B6 (A276. Type 410)	AISI 410 S41000	X10 Cr 13 1.4006	Z10 C 13	410-S21	SUS 410 - G 4303
- B7	AISI 4140	42 CrMo 4 1.7225	42 CD 4	1506-621-A	SNB 7 - G 4107 (SMC 4)
- B8	AISI 304	X5 CrNi 18.9 1.4301	26 CN 18.09	1506-801-B	SUS 304 - G 4303
- B8M	AISI 316	X5 CrNiMo 18.10 1.4401	26 CNT 18.10	1506-845	SUS 316 - G 4107
- B16	-	24 CrMoV 55 1.7733	38 CDV 4.05	1506-661	SNB 16 - G 4107
A194 - 2H		C45 1.0503	A60/CC45	1506-162	S45C - G 4051
Gr 4	-	24 CrMo 5 1.7258	40 D2	1506-240	-
Gr 8	AISI 304	X5 CrNi 18.9 1.4301	26 CN 18.09	1506-801-B	SUS 304 - G 4303
Gr 8M	AISI 315	X5 CrNiMo 18.10 1.4401	26 CND 17.11	1506-845	SUS 316 - G 4303
A276 - Type 420	AISI 420 S42000	X30 Cr 13 1.4028	Z30 C13	420-S45	SUS 420 J2
A320 - L7	AISI 4140	42 CrMo 4 1.7225	42 CD 4	1506-621-A	SCM3 - G 4105
A350 - LF2	-	TT St E 36 1.0508	A48 FPI (A 36-208)	1503-223-410 (32A LT50)	-
A582 - Type 303	AISI 303 S30300	X10 CrNiS 18.9 1.4305	Z10 CNF 18.09	303-S21	SUS 303
- Type 416	AISI 416 A41600	X12 CrS 13 1.4005	Z12 CF 13	416-S21	SUS 418

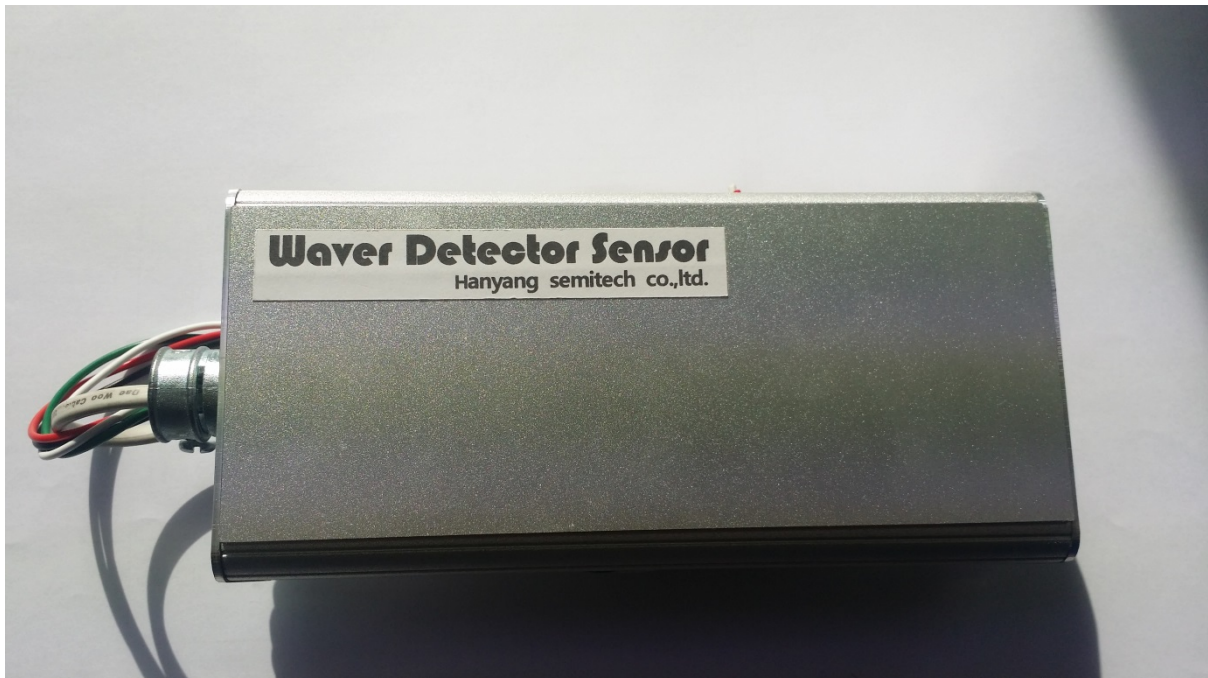
Above comparison is to be intended as a guide.
A light difference in material requirements may be found between one standard and other.
Therefore, the use of an equivalent standard is always subject to Customer's agreement.

Wave Detector Sensor

* Wave Detector Sensor

The wave detector sensor (WDS) is mounted to an acoustic horn to provide confirmation that the acoustic horn is operating properly. When the horn fires, WDS converts the sound pressure waves outside the acoustic horn to an electrical signal, filters a specified frequency component, and measures the amplitude of the filtered signal. As the horn intensity increases, this amplitude will increase proportionally and will be compared to a predefined set point, which is automatically set during the installation process.

When the filtered signal goes above the set point, the relay closes, indicating that the horn is operating properly. If the filtered signal does not rise above the set point, the relay does not close.



Specification

Size(W*L*H).....	215*90*55mm
Product Number	WDS101
Input Voltage.....	220V AC
Contact Type/Rating.....	Normally Open / 10A@250V AC or 5A@100VDC
Temperature Range.....	-40°C to 85°C (-40°F to 185°F)

Connection Type : Terminal Box (1 Signal Cable, 1 Power Cable)

Instruction : Use the Bracket Joint(Bolt/Nut)

Instruction

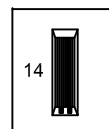
Control Panel

A3 (297mm x 420mm)

	FREE NAME - TELECOMMUNICATIONS
--	--------------------------------

NO.	NAME OF INSTRUMENT	MFG.	MODEL	SIZE/RANGE	DESCRIPTION	REMARK
1.	NAME PLATE			500 x 60	LOCAL CONTROL PANEL FOR SOOT BLOWER (15HSD10EC001)	304St. St.
2.	SQUARE LAMP	KUN HUNG ELECTRIC	KH-5040L-22T	30x40	LED LAMP(RED COLOR)	AC230V
3.	ILLUMINATED PUSH BUTTON SWITCH	SCHNEIDER	XB5-AW33M5	22Ø GREEN	OPEN (LED)	IP 65
4.	ILLUMINATED PUSH BUTTON SWITCH	SCHNEIDER	XB5-AW34M5	22Ø RED	CLOSE (LED)	IP 65
5.	SELECTOR SWITCH	SCHNEIDER	ZB5-AD2	22Ø	LOCAL - REMOTE	IP 65
6.						
7.						
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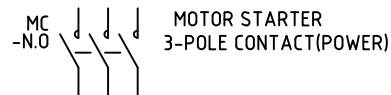
DOCUMENT SUBMISSION STATUS:										
NOTE:										
 14 Jan 2015		FOR CONSTRUCTION				JLEE		G.YOH	C.Y.THOD	NLSJL
REV		DATE		DESCRIPTION		PREP		CHKD	APRD	APPR
OWNER			OWNER'S CONSULTANT							
 VIETNAM OIL AND GAS GROUP (VNG)			 FIGHTNER 10000 K. Co. KS FIGHTNER			 P.V POWER PC				
EPC CONTRACTOR			EPC CONTRACTOR'S CONSULTANT							
 PERPETUUM CONSTRUCTION JOINT STOCK CORPORATION (PJC)			 WorleyParsons (incorporated in England) WOLLEYPARSONS							
POWER (LAND PACKAGE) SUPPLIER			 SOFITZ CORPORATION			 DAELIM DAELIM INDUSTRIAL CO., LTD.				
PROJECT TITLE										
THAI BINH2 THERMAL POWER PLANT 2 x 600MW										
DRAWING TITLE										
DRAWING - TITLE BLOCK										
DRAWING NAME		FUNCTION		NAME		SIGN		DATE		
		DRAIN		JLEE						
		CHKD		G.Y.OH						
		APPR		C.Y.THOD						
		APPR		NLSJL						
DRAWING NO.		JOB NO.		SCALE		REVISION				
TR2-SO2-MP124-G021A-1H-MIA-SPC-003-15		110950		1/1						

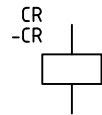


FRONT INNER VIEW

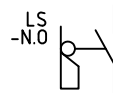
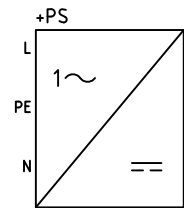
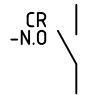
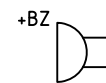
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BFGH

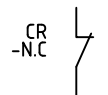
[illegible]



RELAY COIL

LIMIT SWITCH
NORMAL OPEN CONTACTDC24V
POWER SUPPLY
(DC24V)RELAY
NORMAL OPEN CONTACTLIMIT SWITCH
NORMAL OPEN CONTACT

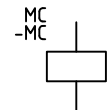
BUZZER

RELAY
NORMAL CLOSE CONTACTLIMIT SWITCH
NORMAL CLOSE CONTACT

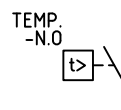
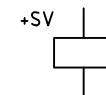
THREE WAVE LAMP



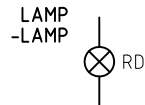
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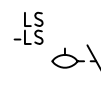
MAGNET COIL

TEMPERATURE SWITCH
NORMAL OPEN CONTACT

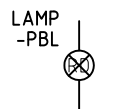
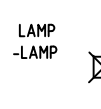
SOLENOID VALVE



LAMP

FLOAT LEVEL SWITCH
NORMAL OPEN CONTACT

TERMINAL BLOCK

ILLUMINATED
PUSH BUTTON
LAMP

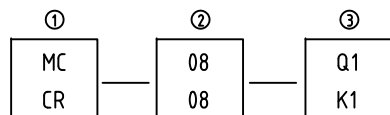
SQUARE LAMP



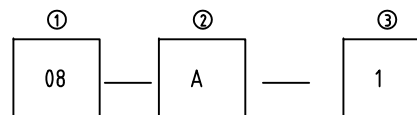
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VIETNAM OIL AND GAS GROUP (VNG)			FICHTNER GmbH & Co. KG FICHTNER PV POWER POC						
EPC CONTRACTOR			EPC CONTRACTOR'S CONSULTANT						
PETROVIETNAM CONSTRUCTION JINT THONG CONSTRUCTION (TPC)			WorleyParsons WorleyParsons						
POWER ISLAND PACKAGE SUPPLIER			DAELIM DAELIM INDUSTRIAL CO., LTD.						
PROJECT TITLE									
THAI BINH2 THERMAL POWER PLANT 2 x 600MW									
DRAWING TITLE									
DRAWING - TITLE BLOCK									
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			APPD C.Y.WHO						
			APPD H.SLEE						
DRAWING NO.			JOB NO.		SCALE		REVISION		
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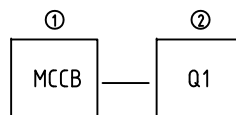
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Job No.	110100
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B - APPROVED WITH COMMENTS	
C - RETURNED FOR CORRECTION	
D - REJECTED	
N - NOT APPLICABLE (REFERENCE ONLY)	
SIGNED BY :	DATE :
DICS PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.	



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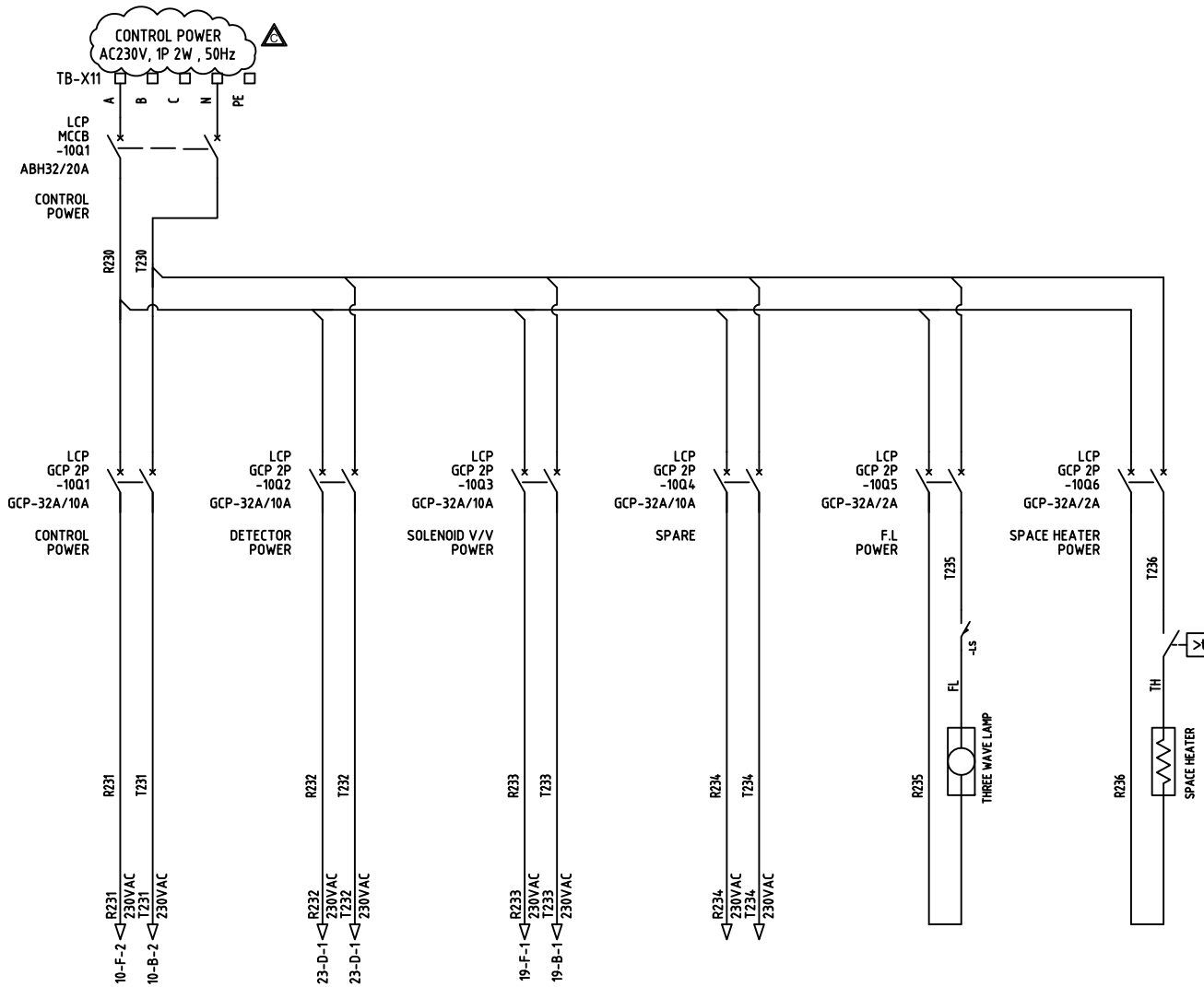


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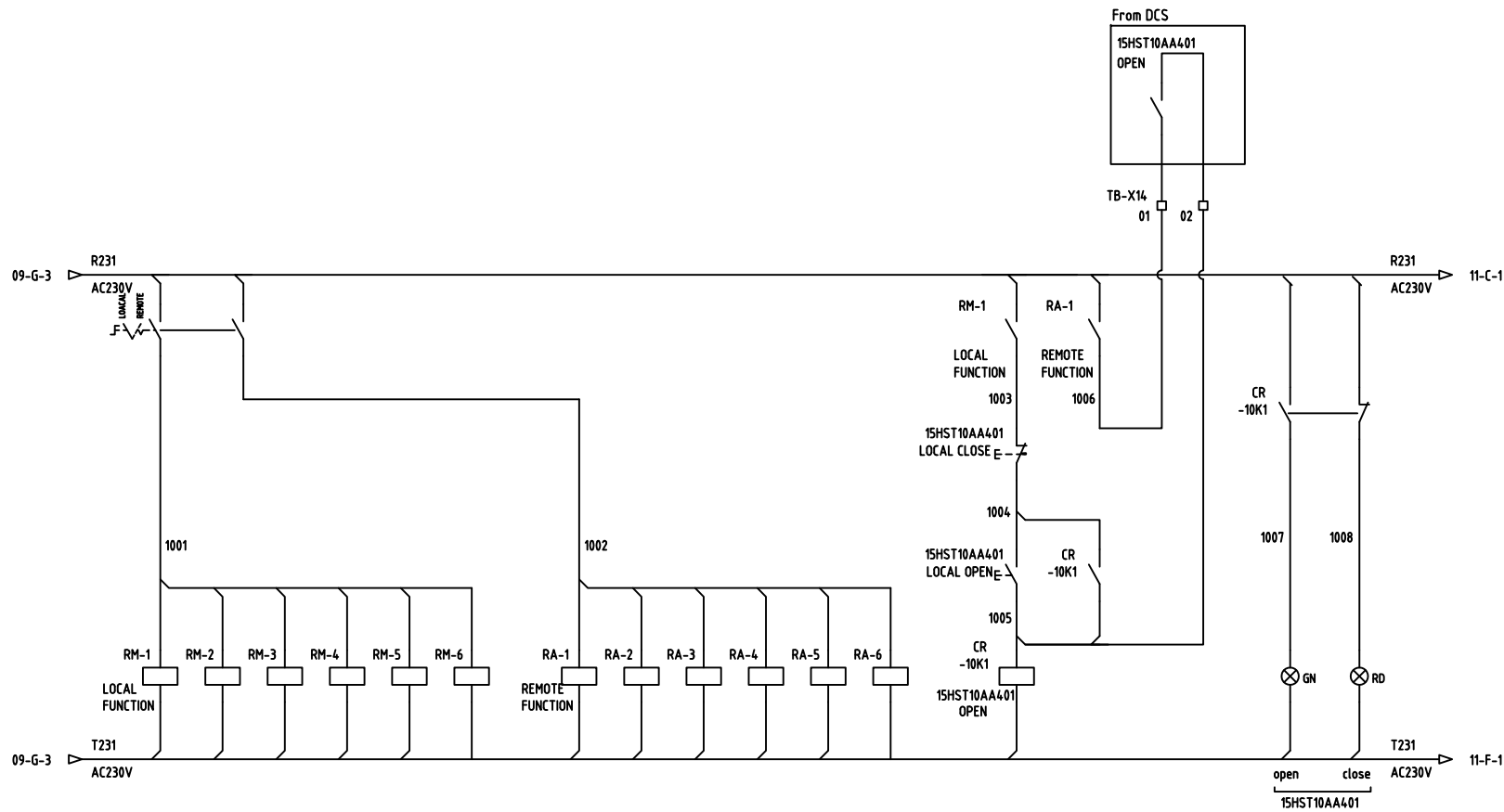


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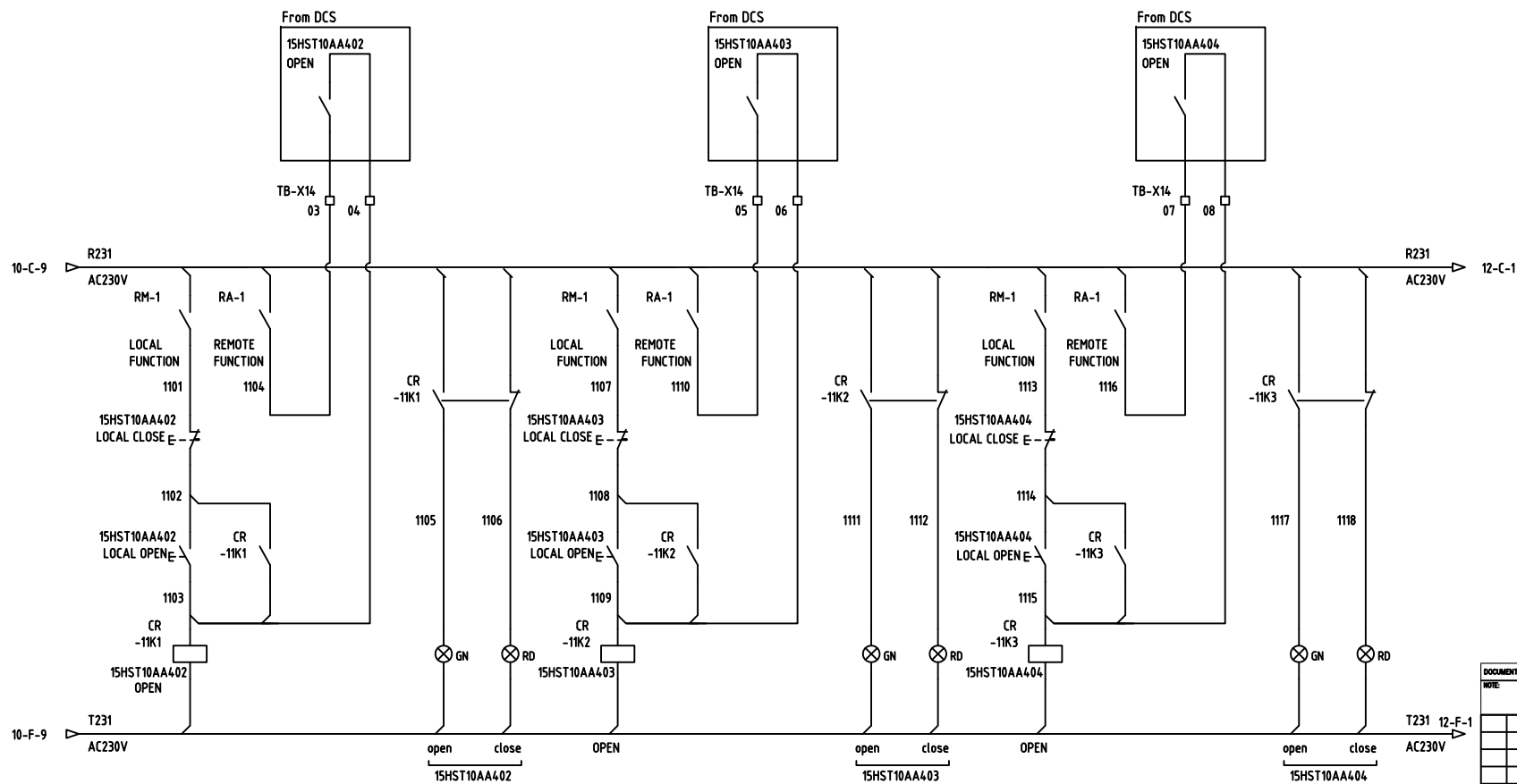
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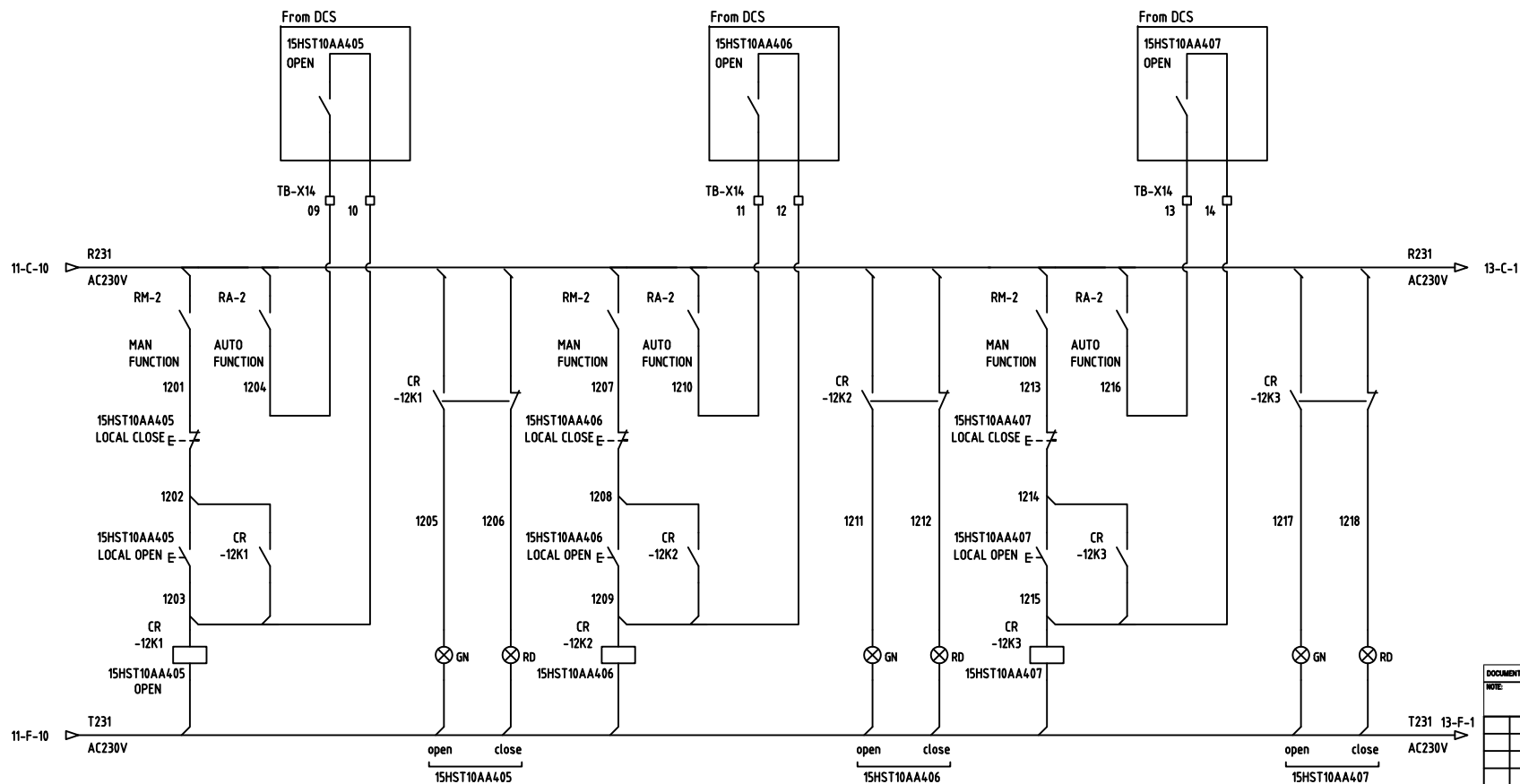


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OWNER			OWNER'S CONSULTANT						
 VIETNAM OIL AND GAS GROUP (VNG)			 FICHTNER GmbH & Co. KG						
EPC CONTRACTOR			EPC CONTRACTOR'S CONSULTANT						
 PETROVIETNAM CONSTRUCTION JOINT STOCK CORPORATION (PVC)			 WorleyParsons WorleyParsons						
POWER ISLAND PACKAGE SUPPLIER			DAELIM INDUSTRIAL CO., LTD.						
 SOJITZ CORPORATION			 DAELIM INDUSTRIAL CO., LTD.						
PROJECT TITLE									
THAI BINH2 THERMAL POWER PLANT 2 x 600MW									
DRAWING - TITLE BLOCK									
DRAWING NO.			JOB NO.			SCALE		REVISION	
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SIGNED BY : _____ DATE : _____ DCS'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.									

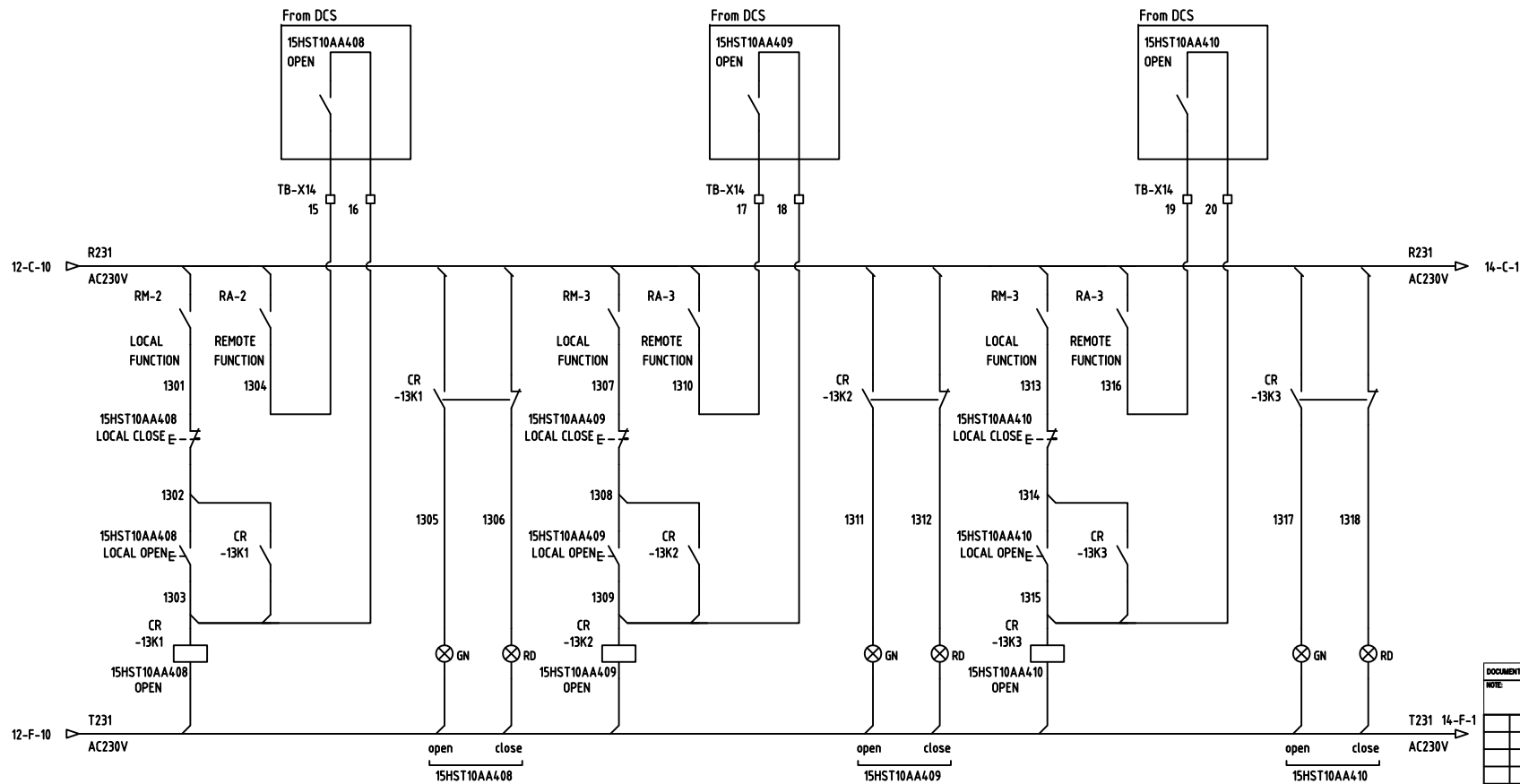


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OWNER			OWNER'S CONSULTANT						
PETROBRAS			FICHTNER						
EPC CONTRACTOR			EPC CONTRACTOR'S CONSULTANT						
WorleyParsons			WorleyParsons						
POWER ISLAND PACKAGE SUPPLIER			DAELIM						
DAELIM INDUSTRIAL CO., LTD.			DAELIM INDUSTRIAL CO., LTD.						
PROJECT TITLE									
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DRAWING TITLE									
DRAWING - TITLE BLOCK									
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CHKD			CLYNN						
APPD			CLYNN						
APPD			ALIE						
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110180			110180	1/1					

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OWNER		OWNER'S CONSULTANT							
 VIETNAM OIL AND GAS GROUP (P)SC		 FICHTNER GmbH & Co. KG FICHTNER				 P. W. POWER POC			
EPC CONTRACTOR		EPC CONTRACTOR'S CONSULTANT							
 PERMETHIAN CONSTRUCTION JOINT VENTURE COMPANY (P)SC		 WorleyParsons INTERNATIONAL WORLDWIDE SERVICES							
POWER ISLAND PACKAGE SUPPLIER		DAELIM							
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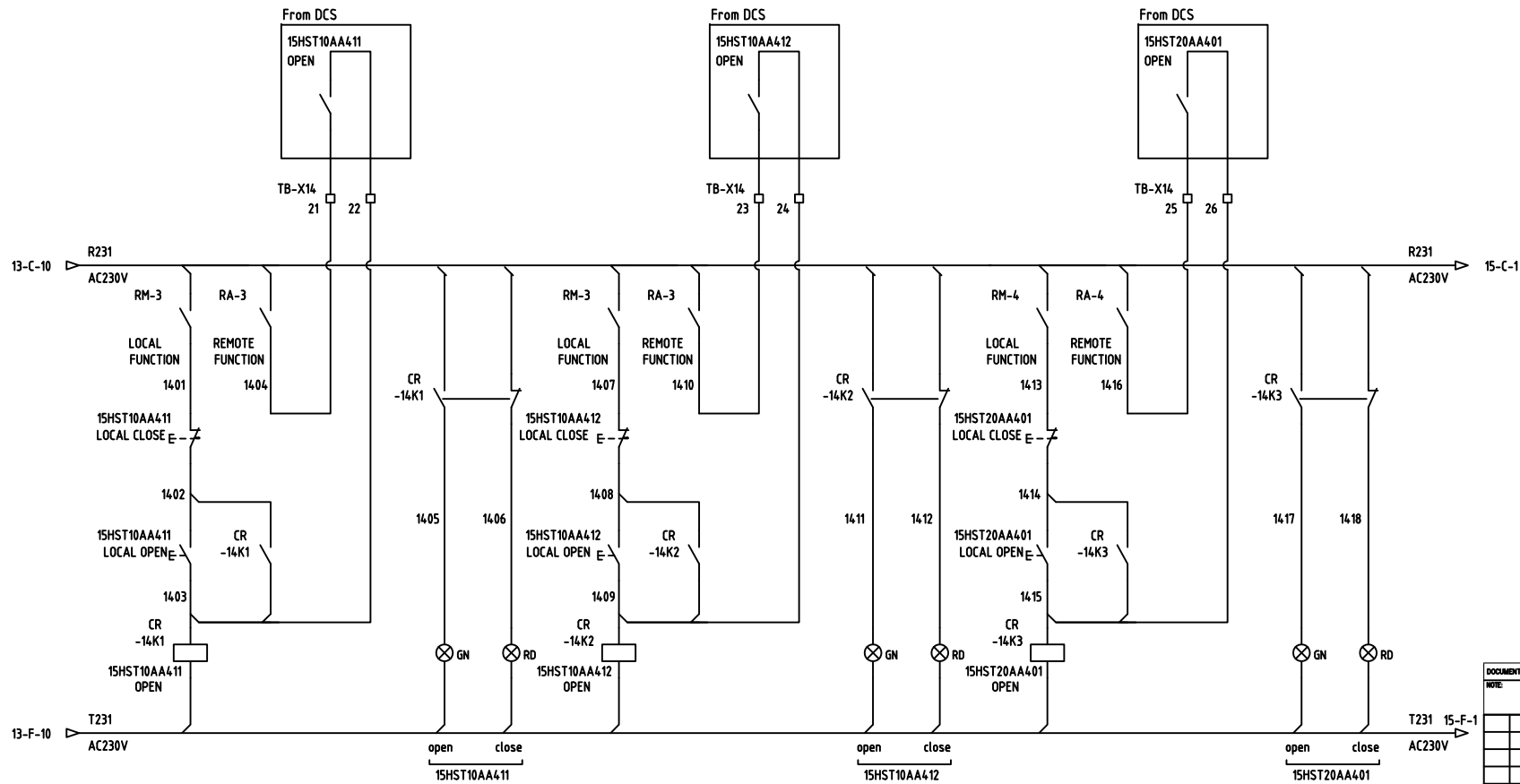


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11									

OWNER'S CONSULTANT		OWNER'S CONSULTANT	
	FICHTNER		FICHTNER
Fichtner & Co. KG		Fichtner & Co. KG	
PETROBRAS CONSTRUCTION JOINT VENTURE		PETROBRAS CONSTRUCTION JOINT VENTURE	
POWER ISLAND PACKAGE SUPPLIER		POWER ISLAND PACKAGE SUPPLIER	
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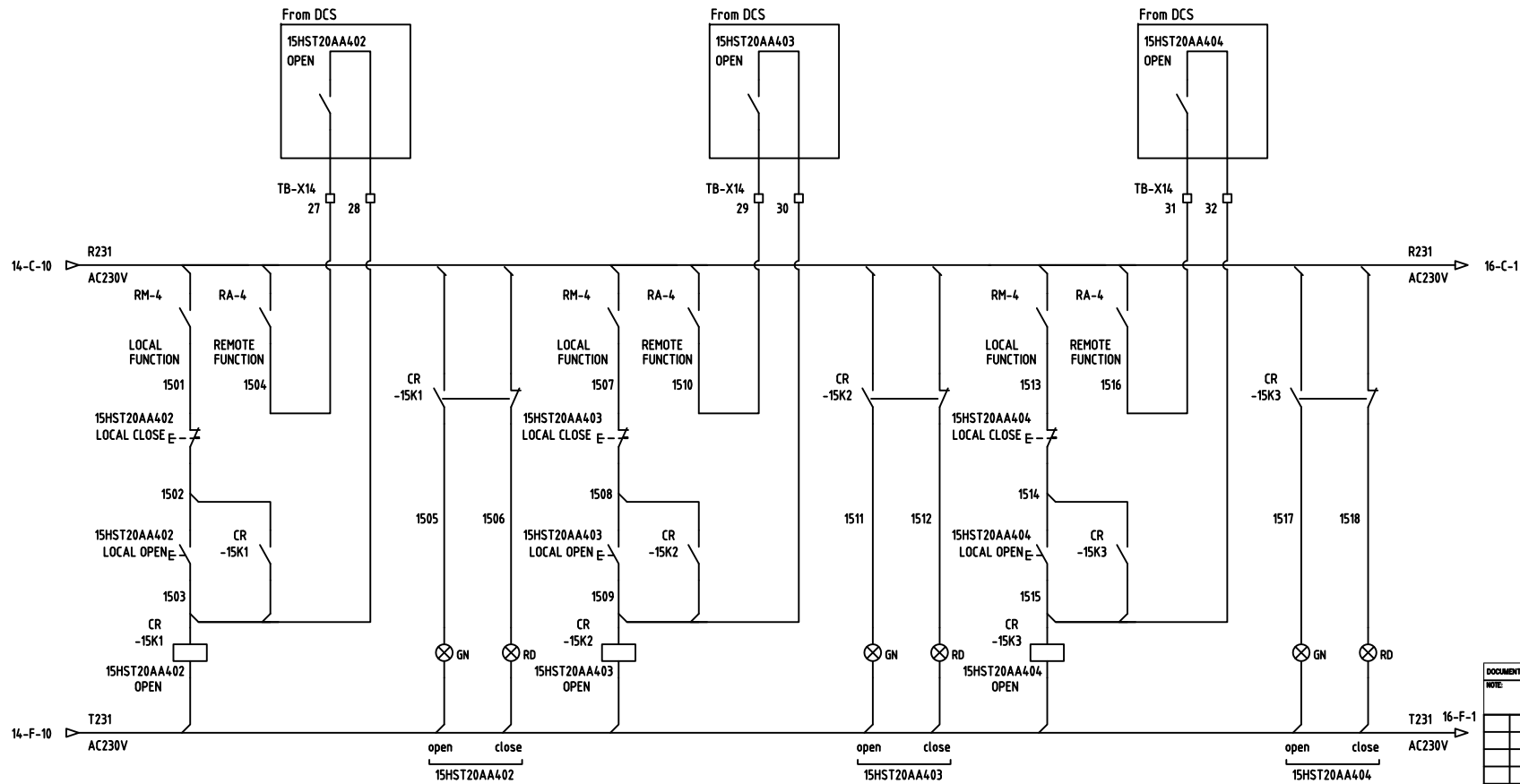
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APRD	ALIE		
DRAWING NO. 102-SOC-VP124-001A-M-11A-SFC-003-04			
JOB NO. 110100			
SCALE 1/1			
REVISION			

SIGNED BY :		DATE :	
DGS'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.			



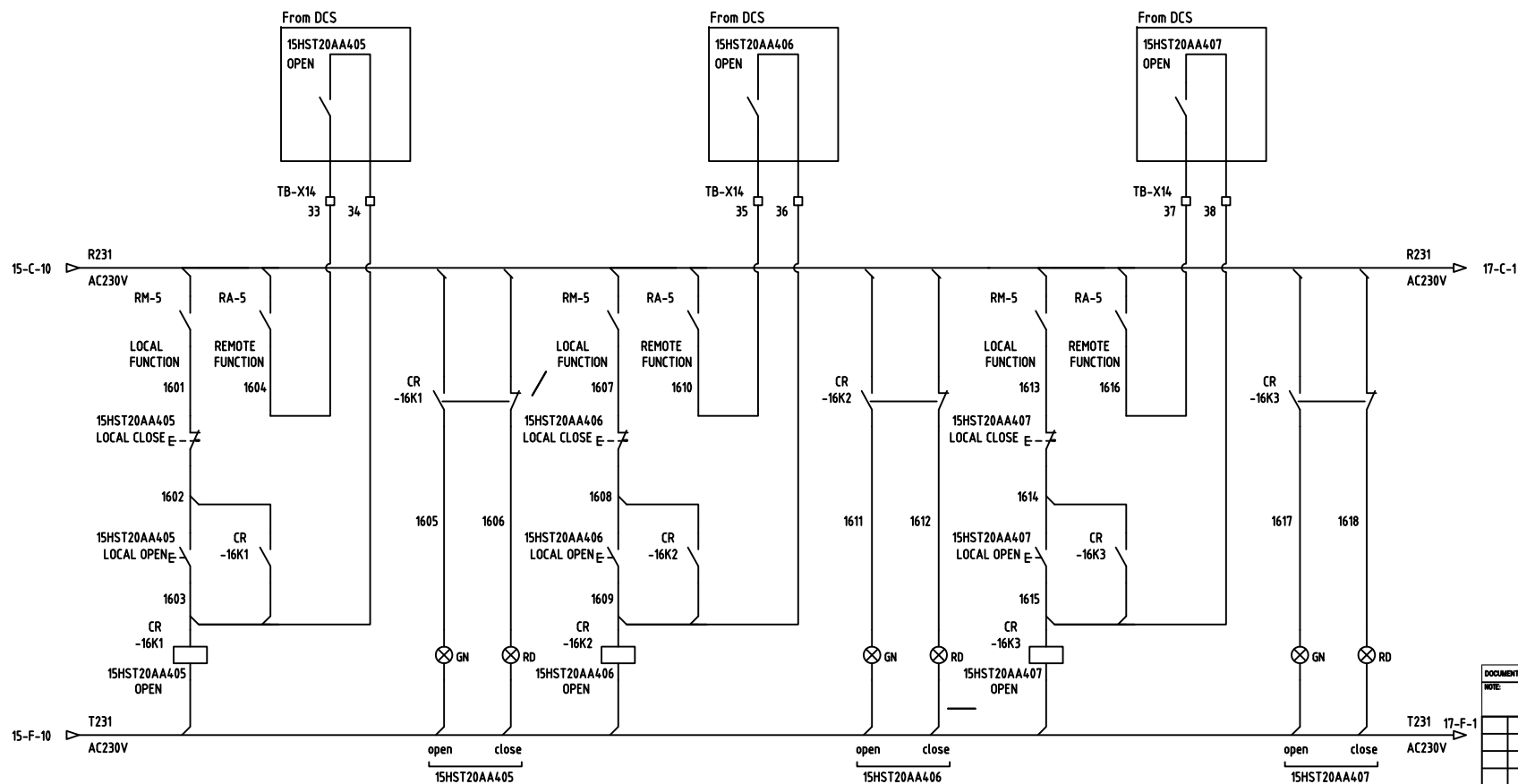
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SCALE 1/1									
REVISION									

Deslim Industrial Co., Ltd.	
Job No.	110180
A - APPROVED	
B - APPROVED WITH COMMENTS	
C - RETURNED FOR CORRECTION	
D - REJECTED	
N - NOT APPLICABLE (REFERENCE ONLY)	
SIGNED BY :	DATE :
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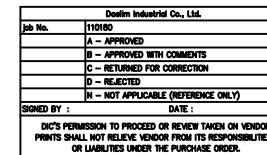


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Deslim Industrial Co., Ltd.	
Job No.	110100
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C - RETURNED FOR CORRECTION	
D - REJECTED	
N - NOT APPLICABLE (REFERENCE ONLY)	
SIGNED BY :	DATE :
DICS PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.	



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EPC CONTRACTOR				EPC CONSTRUCTOR'S CONSULTANT						
<div> PETROTRANS CONSTRUCTION JOINT VENTURE CONSTRUCTION (PCC)</div>				<div> WorleyParsons CONSULTANTS SINGAPORE WOLFPARSONS</div>						
POWER ISLAND PACKAGE SUPPLIER				<div> SOJITZ CORPORATION</div>						
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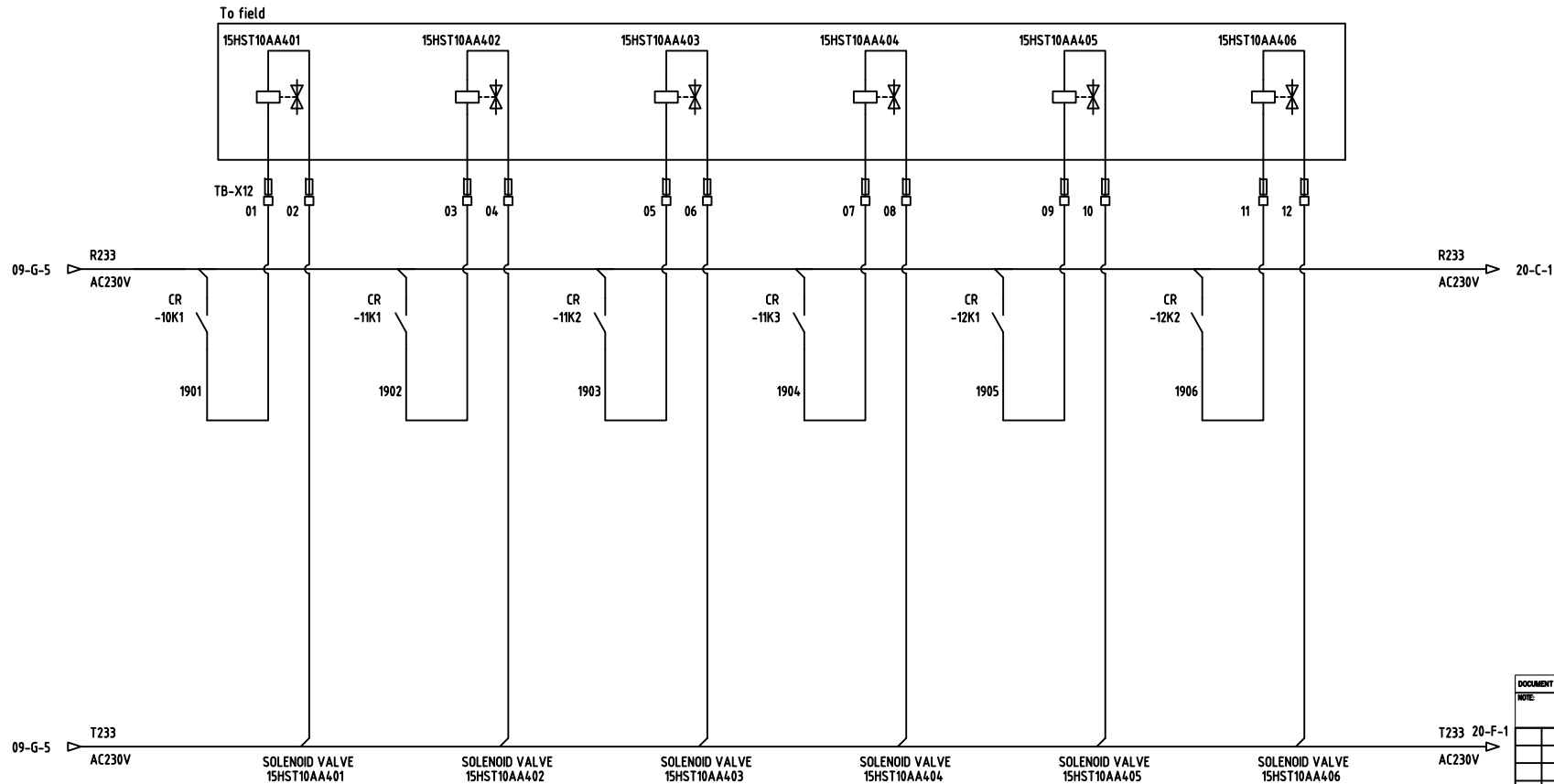


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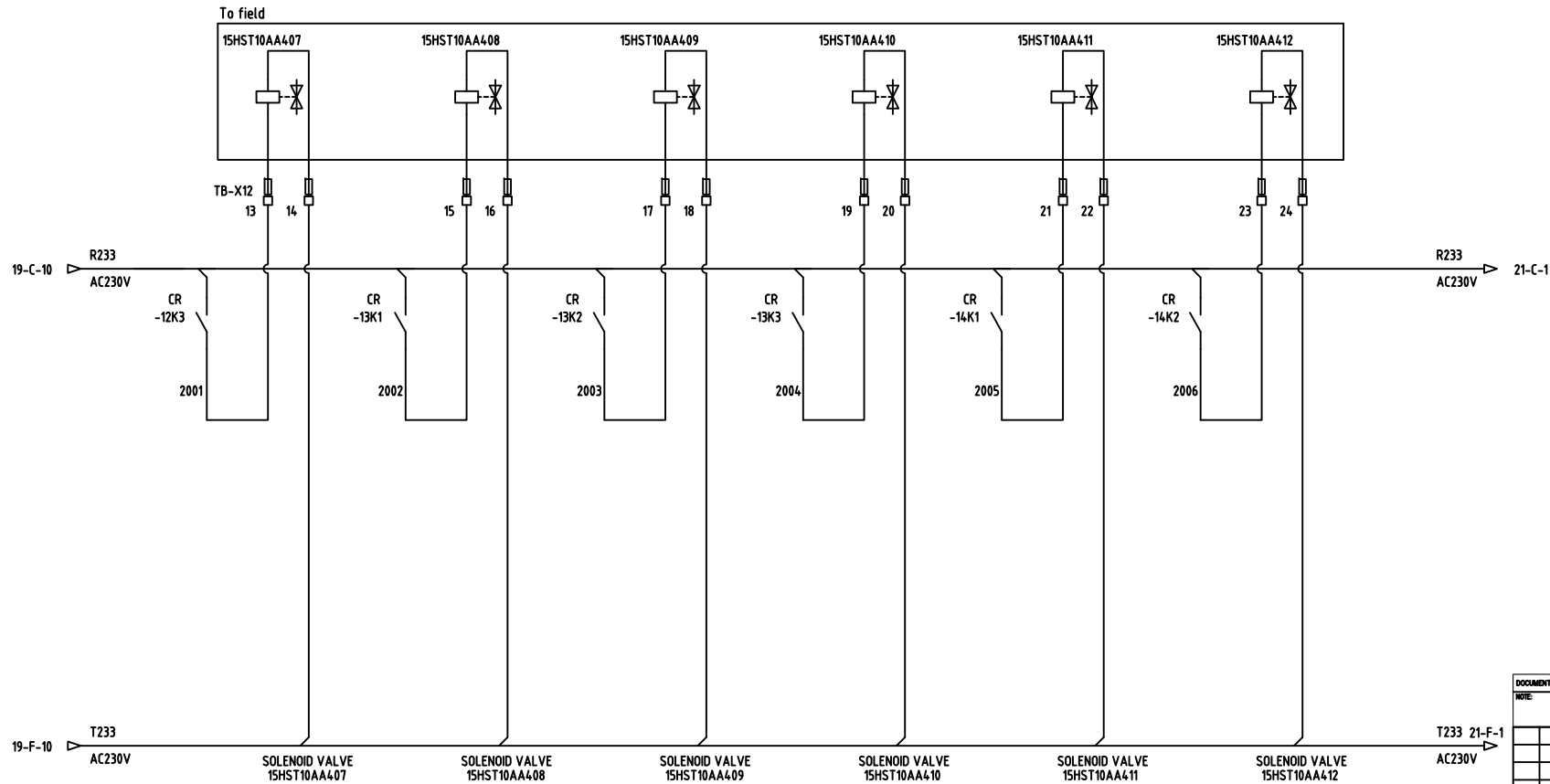


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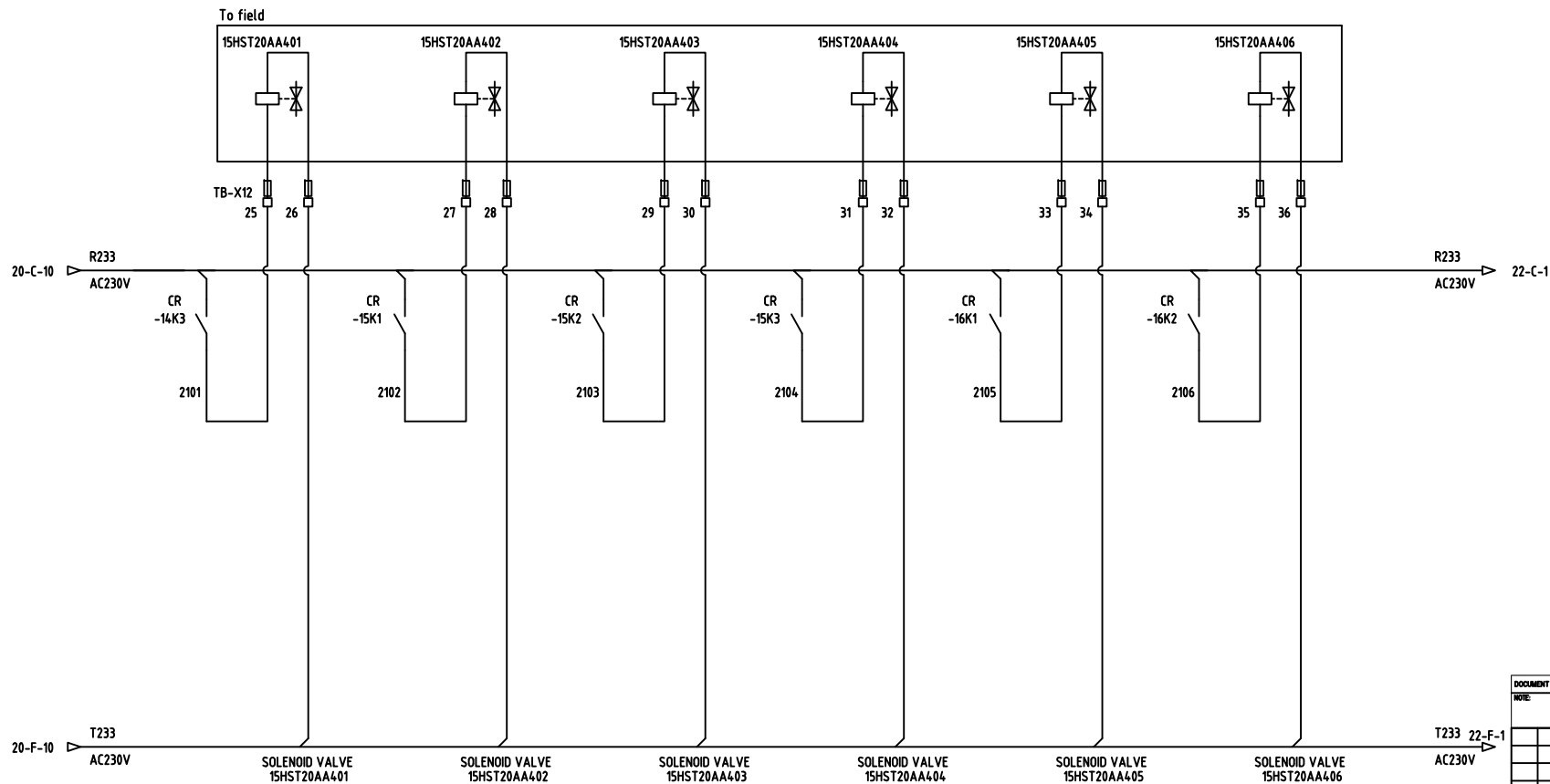
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PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITY
OR LIABILITIES UNDER THE PURCHASE ORDER.



DOCUMENT SUBMISSION STATUS:																													
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EPC CONTRACTOR:  VIETNAM OIL AND GAS GROUP (VNG)  WorleyParsons																													
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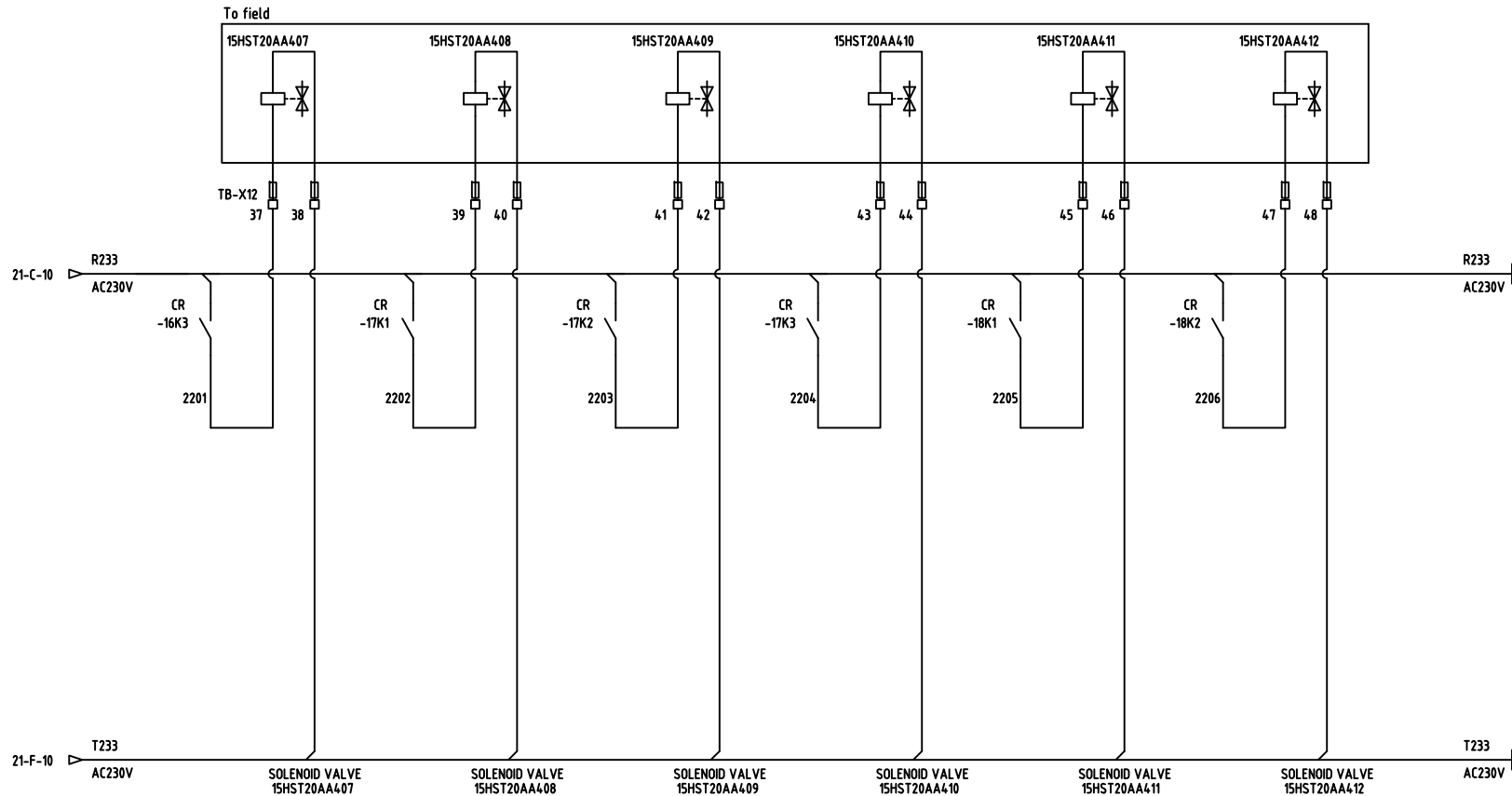
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EPC CONTRACTOR:  VIETNAM OIL AND GAS GROUP (PVG)  WorleyParsons																													
POWER ISLAND PACKAGE SUPPLIER:  SOJITZ CORPORATION  DAELIM INDUSTRIAL CO., LTD.																													
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SCALE 1/1																													
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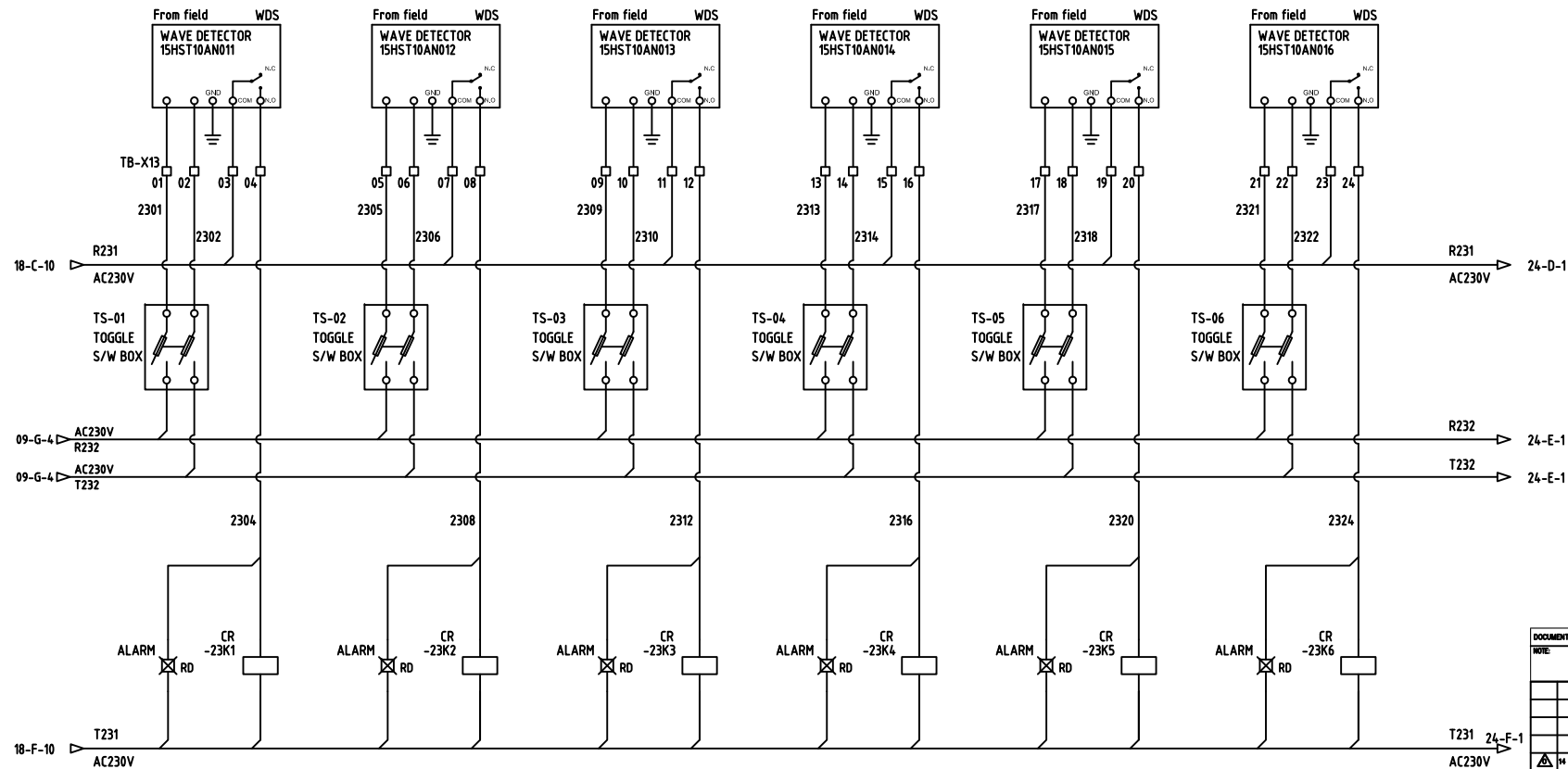
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EPC CONTRACTOR:  FICHTNER									
EPC CONTRACTOR'S CONSULTANT:  WorleyParsons									
POWER ISLAND PACKAGE SUPPLIER:  SOJITZ CORPORATION									
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NAME: ALIE									
SIGN: CLYON									
DATE: 14 Jan 2018									
APPROVED: ALIE									
SCALE: 1/1									
REVISION: 1									

Job No.	110160
Job Name	DAELIM Industrial Co., Ltd.
Job Address	110160
Job Phone	110160
Job Email	110160
Job Website	110160
Job Fax	110160
Job Mobile	110160
Job Internet	110160
Job Social Media	110160
Job Other	110160

SIGNED BY : DATE :
DICT'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR
PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES
OR LIABILITIES UNDER THE PURCHASE ORDER.

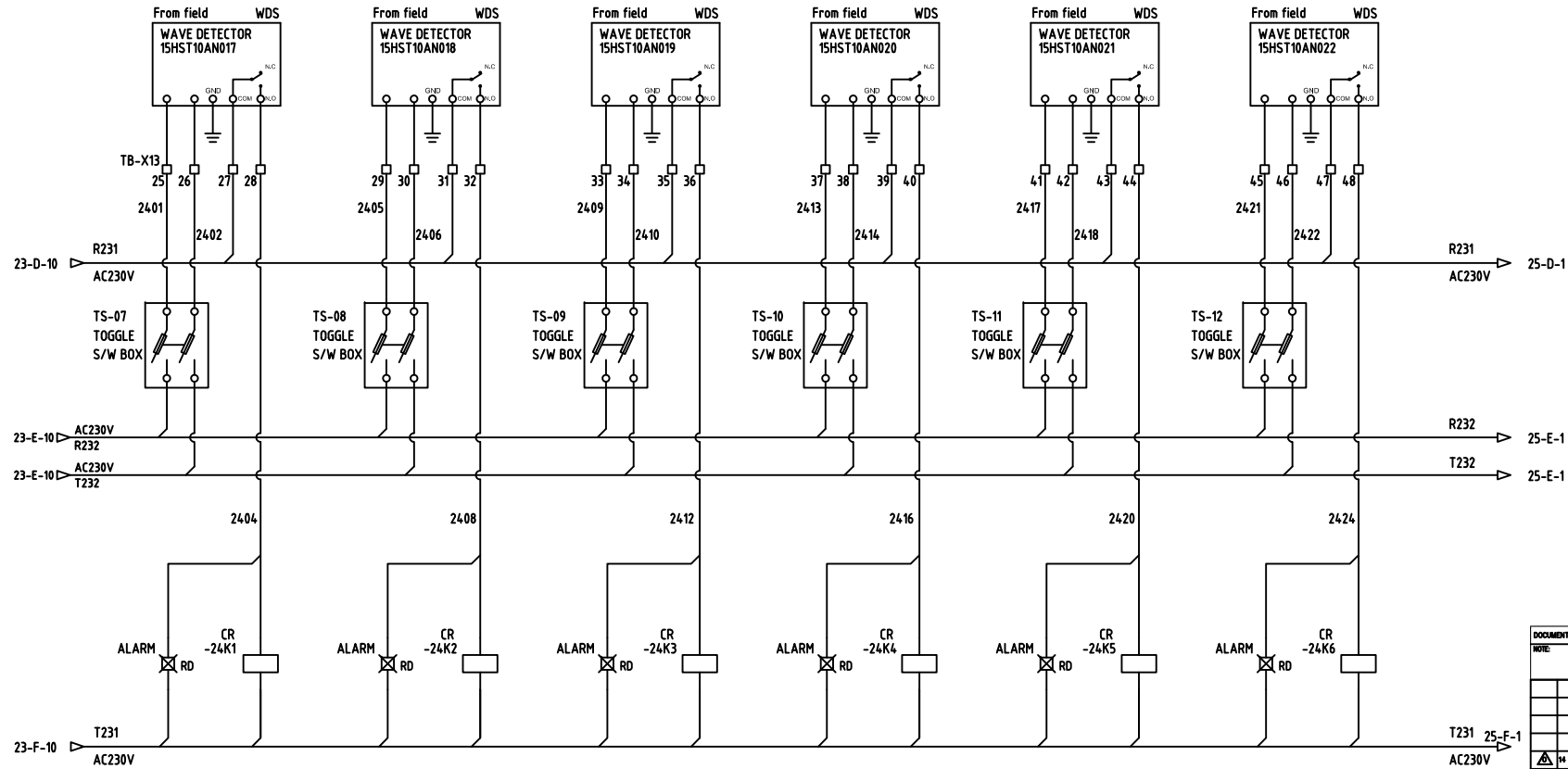


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EPC CONTRACTOR:  VIETNAM OIL AND GAS GROUP (VNG)  WorleyParsons									
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REVISION 									



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EPC CONTRACTOR: FICHTNER									
POWER ISLAND PACKAGE SUPPLIER: SOJITZ CORPORATION									
DAELIM INDUSTRIAL CO., LTD.									
PROJECT TITLE: THAI BINH2 THERMAL POWER PLANT 2 x 600MW									
DRAWING - TITLE BLOCK									
FUNCTION: NAME: SIGN: DATE:									
CHKD: CLYNN									
APRD: CLYNN									
APRD: ALIE									
DRAWING NO. 102-S0C-WP124-001TA-M-MIA-SFC-003-04									
JOB NO. 110180									
SCALE 1/1									
REVISION:									

SIGNED BY :		DATE :	
DICT'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.			

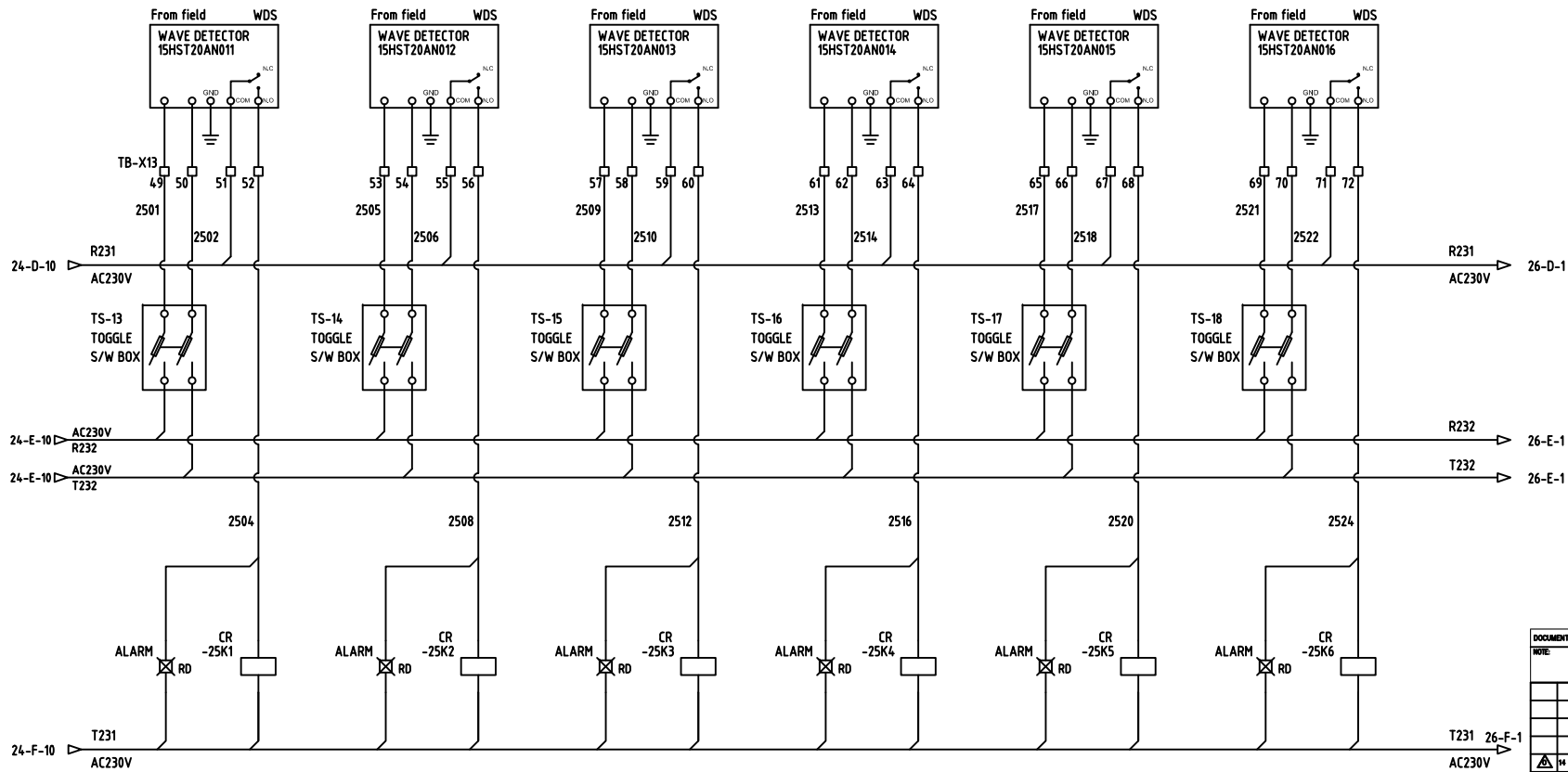


DOCUMENT SUBMISSION STATUS:									
NOTE:									
REV	DATE	DESCRIPTION	PREP	CHKD	APRD	APRD	APRD	APRD	APRD
1	14 Jan 2018	FOR CONSTRUCTION	ALIE	CLYNN	CLYNN	ALIE			
OWNER:									
EPC CONTRACTOR:									
POWER ISLAND PACKAGE SUPPLIER:									
PROJECT TITLE: THAI BINH2 THERMAL POWER PLANT 2 x 600MW									
DRAWING - TITLE BLOCK									
DRAWING NO. 102-SGC-WP124-00HTA-M-MIA-SFC-003-35									
JOB NO. 110180									
SCALE 1/1									
REVISION									

FUNCTION	NAME	SIGN	DATE
DRWN	ALIE		
CHKD	CLYNN		
APRD	CLYNN		
APRD	ALIE		

SIGNED BY : DATE :

DIC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.



DOCUMENT SUBMISSION STATUS:									
NOTE:									
REV	DATE	DESCRIPTION	PREP	CHKD	APRD	APRD	APRD	APRD	APRD
1	14 Jan 2018	FOR CONSTRUCTION	ALIE	CLYNN	CLYNN	ALIE			
OWNER: VIETNAM OIL AND GAS GROUP (P) LTD. FICHTNER									
EPC CONTRACTOR: PETROVIETNAM CONSTRUCTION JOINT STOCK COMPANY (PVC) FICHTNER									
POWER ISLAND PACKAGE SUPPLIER: SOJITZ CORPORATION DAELIM INDUSTRIAL CO., LTD.									
PROJECT TITLE: THAI BINH2 THERMAL POWER PLANT 2 x 600MW									
DRAWING TITLE: DRAWING - TITLE BLOCK									
VEHICLE NAME: FUNCTION NAME SIGN DATE									
DRAWING NO. 102-SOC-VP124-001A-M-MIA-SPC-003-30									
JOB NO. 110180 SCALE 1/1 REVISION									

Job No.	110180
Job Name	DAELIM INDUSTRIAL CO., LTD.
Job Address	110180
Job Phone	110180
Job Email	110180
Job Website	110180
Job Fax	110180
Job Mobile	110180
Job Pager	110180
Job Other	110180

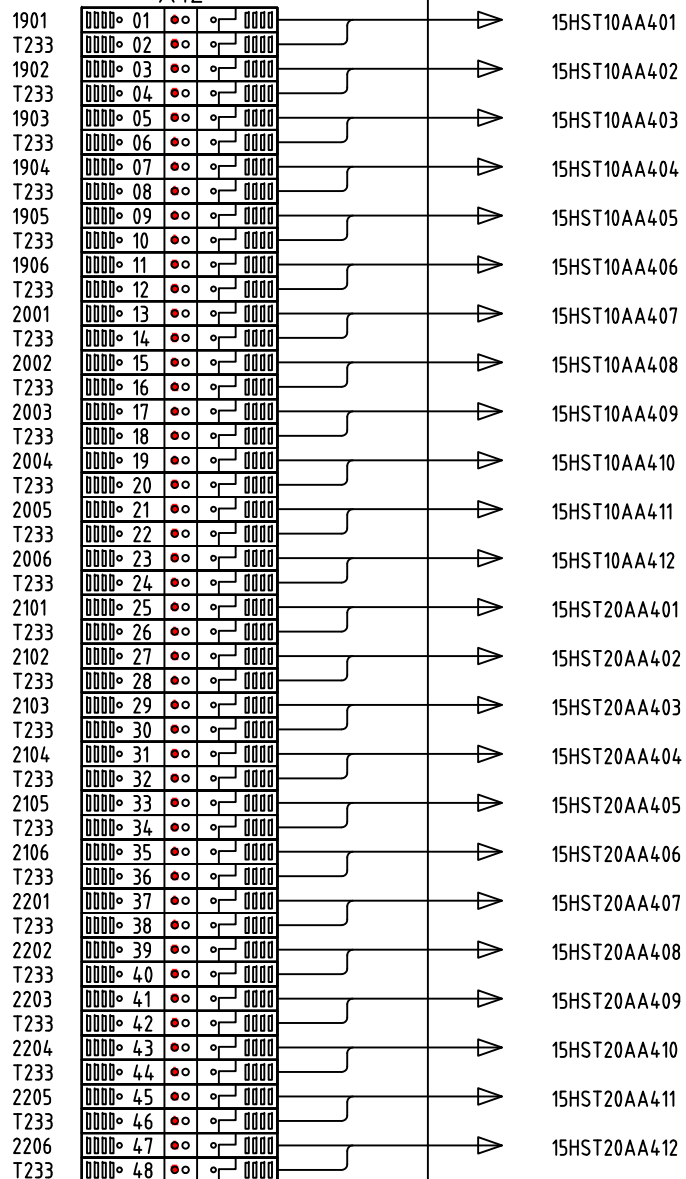
SIGNED BY : DATE :

DIC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.



M.C.C

X12



SOLENOID VALVE
OPEN-CLOSE

[illegible]

2301	0000	01	0000
2302	0000	02	0000
R231	0000	03	0000
2304	0000	04	0000
2305	0000	05	0000
2306	0000	06	0000
R231	0000	07	0000
2308	0000	08	0000
2309	0000	09	0000
2310	0000	10	0000
R231	0000	11	0000
2312	0000	12	0000
2313	0000	13	0000
2314	0000	14	0000
R231	0000	15	0000
2316	0000	16	0000
2317	0000	17	0000
2318	0000	18	0000
R231	0000	19	0000
2320	0000	20	0000
2321	0000	21	0000
2322	0000	22	0000
R231	0000	23	0000
2324	0000	24	0000
2401	0000	25	0000
2402	0000	26	0000
R231	0000	27	0000
2404	0000	28	0000
2405	0000	29	0000
2406	0000	30	0000
R231	0000	31	0000
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R231	0000	35	0000
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2418	0000	42	0000
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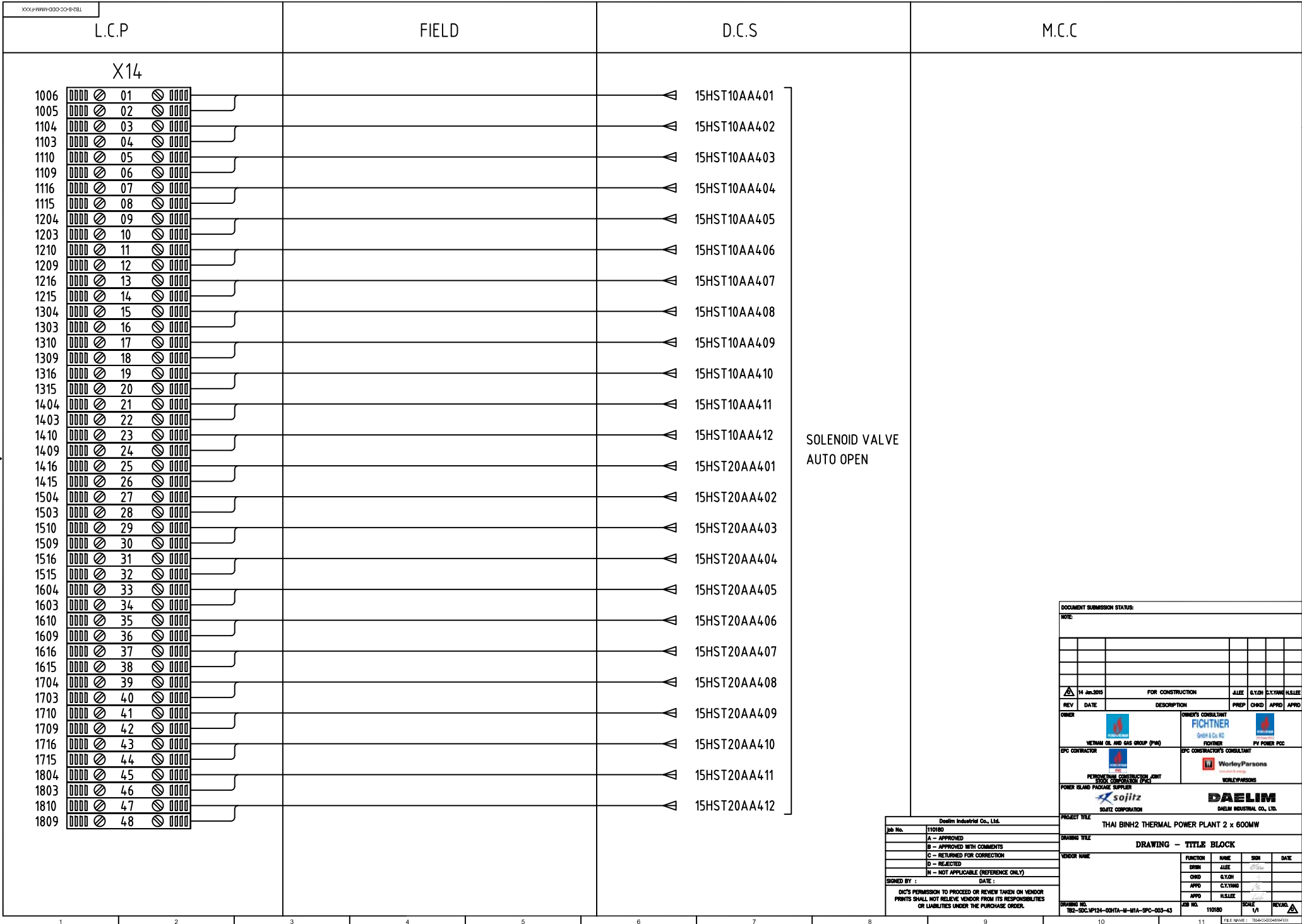
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POWER CONTACT	]	WAVE DETECTOR 15HST10AN012
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POWER CONTACT	]	WAVE DETECTOR 15HST10AN014
POWER CONTACT	]	WAVE DETECTOR 15HST10AN015
POWER CONTACT	]	WAVE DETECTOR 15HST10AN016
POWER CONTACT	]	WAVE DETECTOR 15HST10AN017
POWER CONTACT	]	WAVE DETECTOR 15HST10AN018
POWER CONTACT	]	WAVE DETECTOR 15HST10AN019
POWER CONTACT	]	WAVE DETECTOR 15HST10AN020
POWER CONTACT	]	WAVE DETECTOR 15HST10AN021
POWER CONTACT	]	WAVE DETECTOR 15HST10AN022

[illegible]

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R231	0000	95	0000
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POWER CONTACT	]	WAVE DETECTOR 15HST20AN011
POWER CONTACT	]	WAVE DETECTOR 15HST20AN012
POWER CONTACT	]	WAVE DETECTOR 15HST20AN013
POWER CONTACT	]	WAVE DETECTOR 15HST20AN014
POWER CONTACT	]	WAVE DETECTOR 15HST20AN015
POWER CONTACT	]	WAVE DETECTOR 15HST20AN016
POWER CONTACT	]	WAVE DETECTOR 15HST20AN017
POWER CONTACT	]	WAVE DETECTOR 15HST20AN018
POWER CONTACT	]	WAVE DETECTOR 15HST20AN019
POWER CONTACT	]	WAVE DETECTOR 15HST20AN020
POWER CONTACT	]	WAVE DETECTOR 15HST20AN021
POWER CONTACT	]	WAVE DETECTOR 15HST20AN022

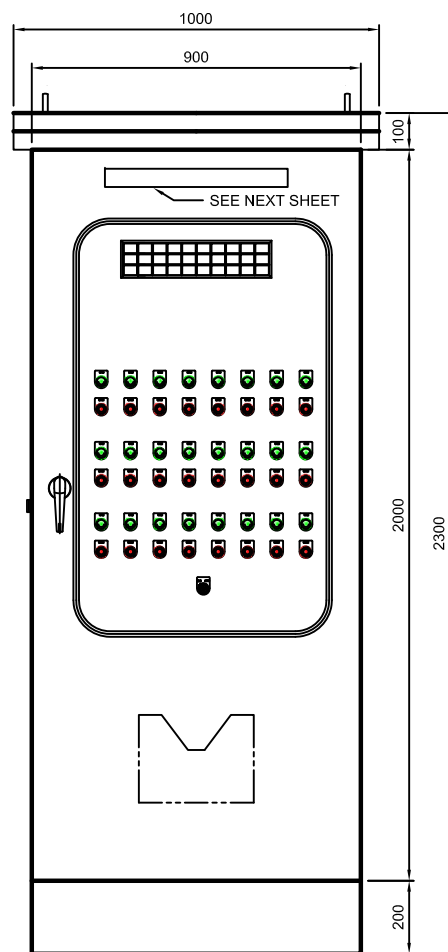
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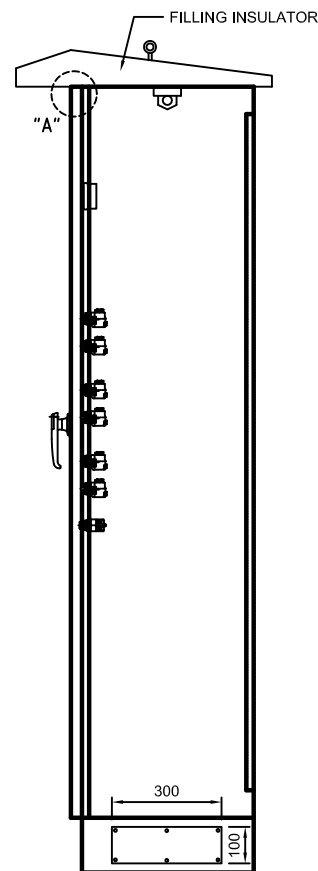
DWG. TITLE

01	INDEX
02	PANEL DIMENSIONAL DWG
03	NAME PLATE
04	PARTS LIST
05	PNL ARRANGEMENT
06~08	LEGEND
09	POWER LINE
10~18	WIRING DIAGRAM
19~22	WIRING DIAGRAM FOR SOLENOID VALVE
23~26	WIRING DIAGRAM FOR WAVE DETECTOR
27	WIRING DIAGRAM FOR DCS POINT
28	TB ARRANGEMENT(MAIN)
29	TB ARRANGEMENT(SOV)
30	TB ARRANGEMENT(WAVE DETECTOR-1)
31	TB ARRANGEMENT(WAVE DETECTOR-2)
32	TB ARRANGEMENT(FR DCS)
33	TB ARRANGEMENT(TO DCS)

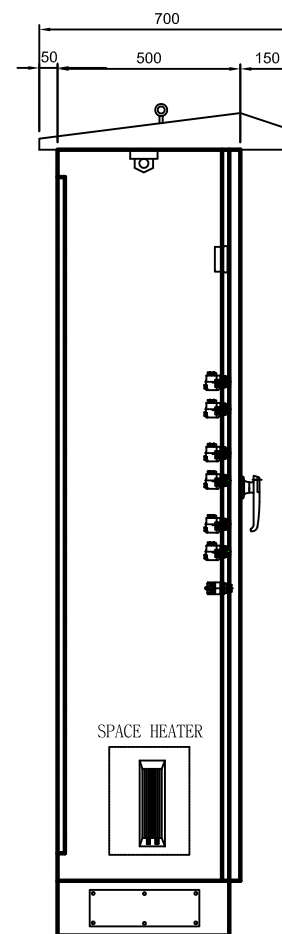
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		NOTE:							
14 Jan.2015		FOR CONSTRUCTION				ALUE	GLYON	CLTYANG	HLSJIE
REV	DATE	DESCRIPTION				PREP	CHRD	APRD	APRQ
OWNER		 VIETNAM OIL AND GAS GROUP (VIG)				OWNER'S CONSULTANT FICHTNER <small>GmbH & Co. KG</small> FICHTNER			
EPC CONTRACTOR		 PERENNIAL CONSTRUCTION JOINT STOCK CORPORATION (PGC)				EPC CONTRACTOR'S CONSULTANT WorleyParsons <small>INCORPORATED IN USA</small> WORLEYPARSONS			
POWER ISLAND PACKAGE SUPPLIER		 SOJITZ CORPORATION				 DAELIM INDUSTRIAL CO., LTD.			
PROJECT TITLE		THAI BINH2 THERMAL POWER PLANT 2 x 600MW							
DRAWING TITLE		DRAWING – TITLE BLOCK							
VENOR NAME		FUNCTION		NAME		SIGN		DATE	
SIGNED BY : _____ DATE : _____ DIC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.		DRIN		ALUE					
		CHRD		GLYON					
		APPD		CLTYANG					
		APPD		HLSJIE					
		JOB NO.		SCALE		SCALE		REWORK	
DRAWING NO. TBC-SQC/VP124-OI2A-U-M-SPA-SPC-003-45		JOB NO.		110180		SCALE 1/1		REWORK	
Daelim Industrial Co., Ltd.									
Job No. 110180									
A – APPROVED									
B – APPROVED WITH COMMENTS									
C – RETURNED FOR CORRECTION									
D – REJECTED									
H – NOT APPLICABLE (REFERENCE ONLY)									



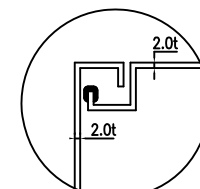
FRONT VIEW



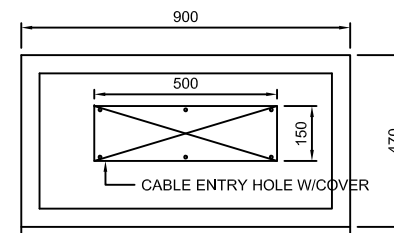
RIGHTSIDE VIEW



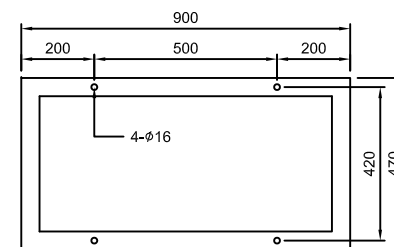
LEFTSIDE VIEW



DETAIL "A"



PANEL BOTTOM VIEW



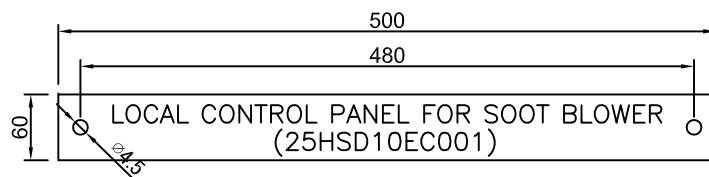
ANCHOR HOLE DETAIL

1. ENCLOSURE
SIZE: 900(W)x2250(H)x500(D)
2. ENCLOSURE PLATE
FRONT PLATE : STS 304 2.0t
BODY PLATE : STS 304 2.0t
BASE PLATE : STS 304 2.5t
INNER PLATE : STS 304 1.5t
3. TOTAL WEIGHT : 400KG
4. IP55

DOCUMENT SUBMISSION STATUS:						
NOTE:						
			</			

Doellm Industrial Co., Ltd.	
Job No.	110180
	A - APPROVED
	B - APPROVED WITH COMMENTS
	C - RETURNED FOR CORRECTION
	D - REJECTED
	N - NOT APPLICABLE (REFERENCE ONLY)
SIGNED BY :	DATE :

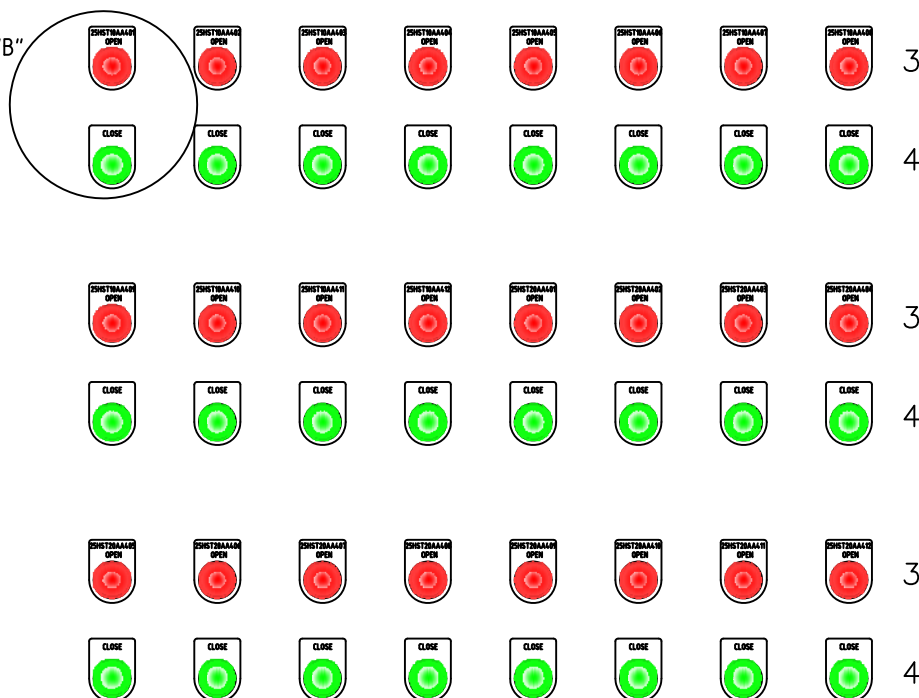
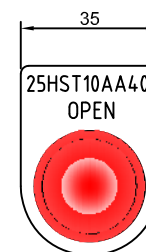
DIC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITY OR LIABILITIES UNDER THE PURCHASE ORDER.



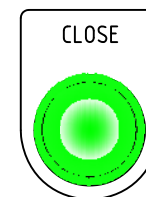
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- TEXT FONT : ARIAL NARROW
- LETTER HEIGHT : 15mm
- LETTER COLOR : BLACK



DETAIL "B"



- MATERIAL : ACRYLIC
- BASE COLOR : MILK WHITE
- LETTER COLOR : BLACK

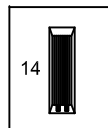
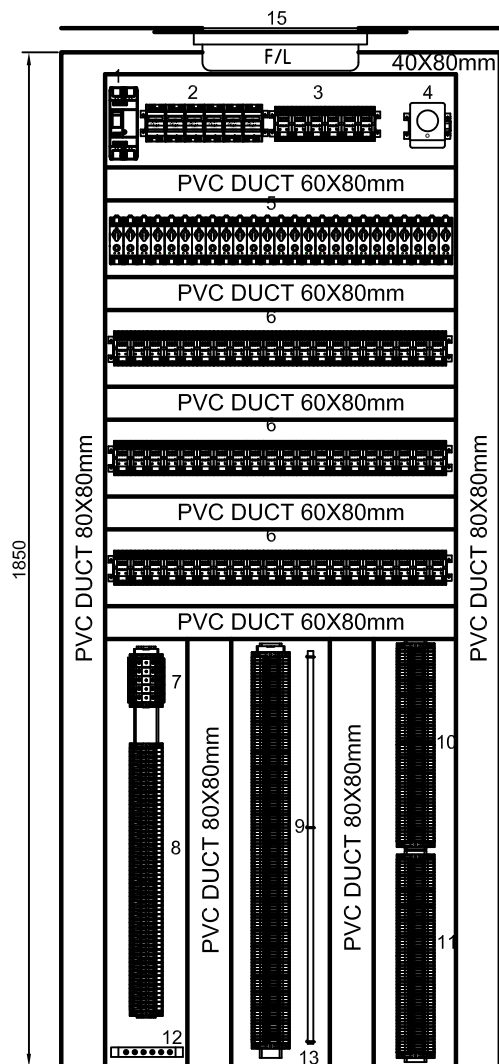


DETAIL "B"

[illegible]

Dowlam Industrial Co., Ltd.	
Job No.	110180
A - APPROVED	
B - APPROVED WITH COMMENTS	
C - RETURNED FOR CORRECTION	
D - REJECTED	
N - NOT APPLICABLE (REFERENCE ONLY)	
SIGNED BY :	DATE :
DDC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT BE AVOIDED FROM THE RESPONSIBILITIES OF THE ARCHITECT, ENGINEER, THE PURCHASER, OR THE	

[illegible]



LEFTSIDE INNER VIEW

FRONT INNER VIEW

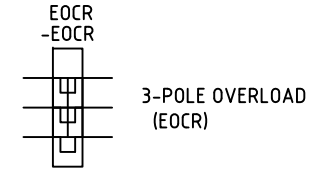
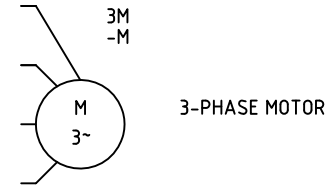
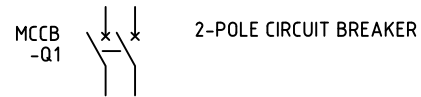
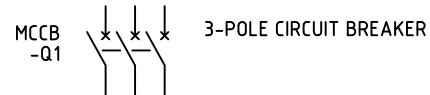
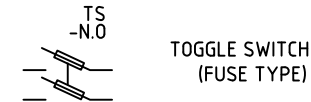
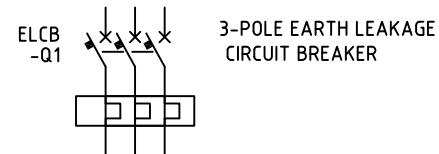
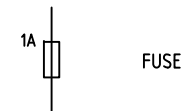
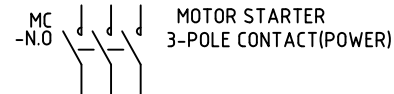
PARTS LIST

NO.	DESCRIPTION	SPECIFICATION	MODEL	MFG.
1	MCCB	MAIN MCCB	ABH-32	LS
2	GCP	CIRCUIT PROTECTOR	GCP-32	HONEYWELL
3	RELAY(CR)	SPARE RELAY(6ea)	SZR-MY4-N1	HONEYWELL
4	TH	THERMOSTAT, 0~90deg	RTM-90H	RUN ELECTRIC
5	TS	TOGGLE SWITCH BOX	SPB-220	SUNJIN SYSTEM
6	RELAY(CR)	CONTROL RELAY(60ea)	SZR-MY4-N1	HONEYWELL
7	TB-X11	MAIN TERMINAL BLOCK	WDU 16	WEIDMULLER
8	TB-X12(60ea)	TERMINAL BLOCK FOR SOLENOID VALVE	WSI 6 LD	WEIDMULLER
9	TB-X13(120ea)	TERMINAL BLOCK FOR WAVE DETECTOR	WDU 4	WEIDMULLER
10	TB-X14(60ea)	TERMINAL BLOCK(FROM DCS)	WDU 4	WEIDMULLER
11	TB-X15(60ea)	TERMINAL BLOCK(TO DCS)	WDU 4	WEIDMULLER
12	PE	GROUND BUS BAR	100A	
13	PE	GROUND BUS BAR	60A	
14	HT	SPACE HEATER	RHTC-80-180	RUN ELECTRIC
15	FL	THREE WAVE LAMP	20W	

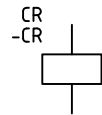
DOCUMENT SUBMISSION STATUS:							
NOTE:							
	14 Jan 2015	FOR CONSTRUCTION			AJEE	G.Y.M	N.S.L.I.E.
REV	DATE	DESCRIPTION			PREP	CHECK	APPROV
OWNER		PETROTRANS PETRONAS OIL AND GAS GROUP (PM)		OTHER'S CONSULTANT FIGHTNER FIGHTNER & CO. KG FIGHTNER		PT POWER PCO	
EPC CONTRACTOR		 PERMUTAMIN CONSTRUCTION JINT TRUCK CORPORATION (PMI)		EPC CONTRACTOR'S CONSULTANT WorleyParsons <small>worleyparsons.com.au</small> WOLLEYPARSONS			
POWER ISLAND PACKAGE SUPPLIER		 SOFITZ CORPORATION		<div style="text-align: center;"> DAELIM DAELIM INDUSTRIAL CO., LTD. </div>			
PROJECT TITLE							
THAI BINH2 THERMAL POWER PLANT 2 x 600MW							
DRAWING - TITLE BLOCK							
DRAWING TITLE							
VENDOR NAME		FUNCTION		NAME	SIGN	DATE	
		DRAWN		AJLEE	(Signature)		
		CHECK		G.Y.M	(Signature)		
		APPROVED		A.C.TYANG	(Signature)		
		APPD		N.S.L.I.E.	(Signature)		
DRAWING NO.		JOB NO.		SCALE	REVISION		
TRC-SPC-WF124-GDNTH-A-MIA-SFC-C03-49		110958		1/1			

Doellm Industrial Co., Ltd.	
Job No.	110180
	A - APPROVED
	B - APPROVED WITH COMMENTS
	C - RETURNED FOR CORRECTION
	D - REJECTED
	N - NOT APPLICABLE (REFERENCE ONLY)
SIGNED BY :	DATE :

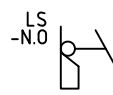
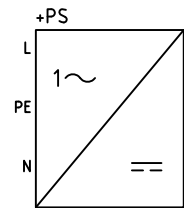
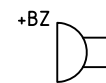
DIC'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITY OR LIABILITIES UNDER THE PURCHASE ORDER.



Deslim Industrial Co., Ltd.			
Job No.	110180		
A - APPROVED			
B - APPROVED WITH COMMENTS			
C - RETURNED FOR CORRECTION			
D - REJECTED			
N - NOT APPLICABLE (REFERENCE ONLY)			
SIGNED BY :			
DATE :			
DICT'S PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.			
DRAWING TITLE			
THAI BINH2 THERMAL POWER PLANT 2 x 600MW			
DRAWING - TITLE BLOCK			
FUNCTION	NAME	SIGN	DATE
DRWN	ALIE		
CHKD	C.Y. YAN		
APPD	C.Y. YAN		
APPD	ILSLEE		
DRAWING NO.	182-SOC.VP124-001TA-M-WTA-SFC-003-00	JOB NO.	110180
SCALE	1/A	REVNO.	



RELAY COIL

LIMIT SWITCH
NORMAL OPEN CONTACTDC24V
POWER SUPPLY
(DC24V)RELAY
NORMAL OPEN CONTACTLIMIT SWITCH
NORMAL OPEN CONTACT

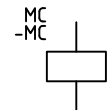
BUZZER

RELAY
NORMAL CLOSE CONTACTLIMIT SWITCH
NORMAL CLOSE CONTACT

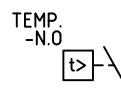
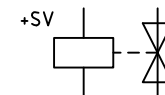
THREE WAVE LAMP



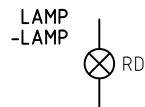
PANEL VENTILATE FAN



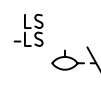
MAGNET COIL

TEMPERATURE SWITCH
NORMAL OPEN CONTACT

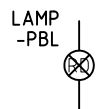
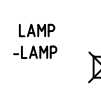
SOLENOID VALVE



LAMP

FLOAT LEVEL SWITCH
NORMAL OPEN CONTACT

TERMINAL BLOCK

ILLUMINATED
PUSH BUTTON
LAMP

SQUARE LAMP

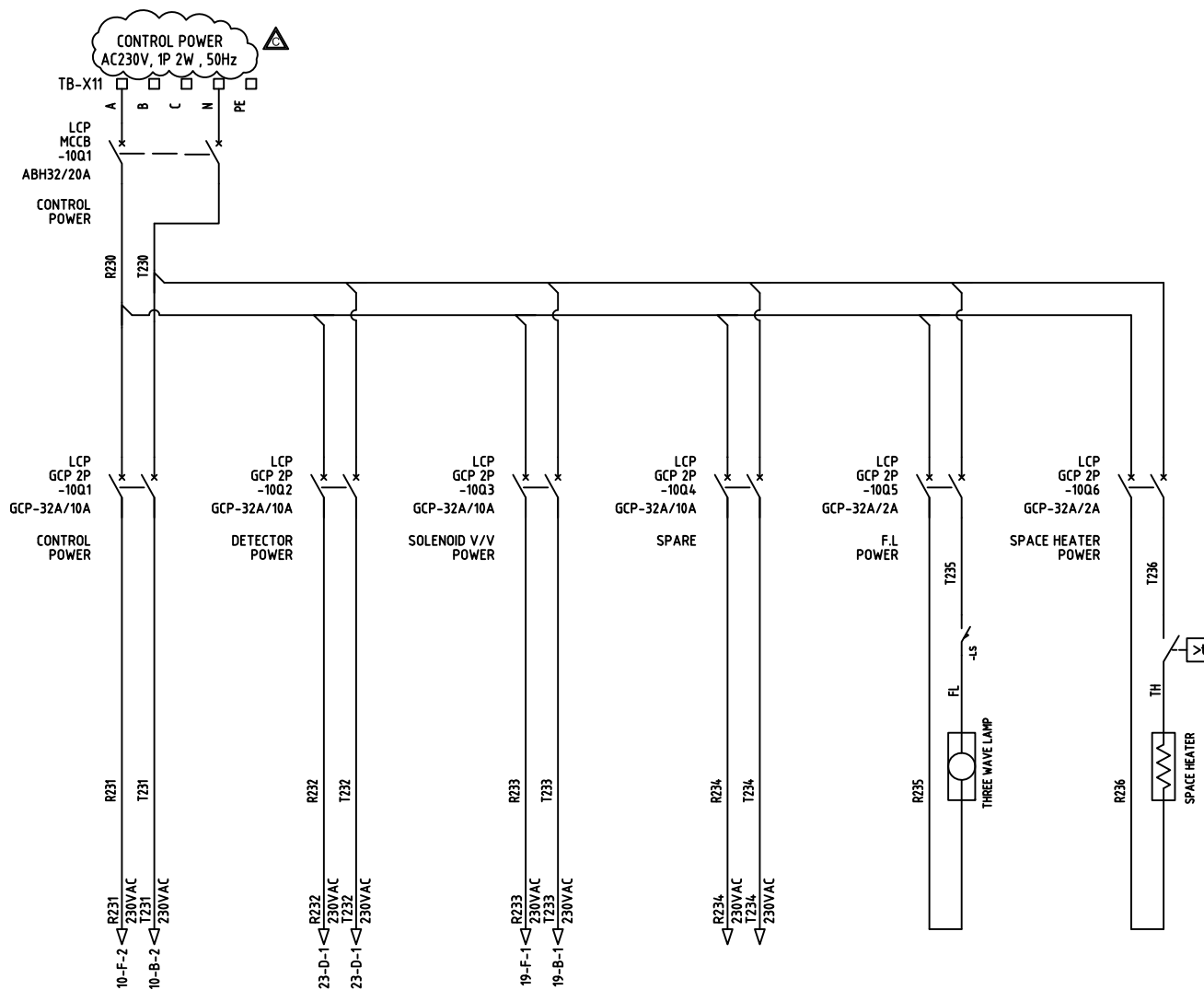


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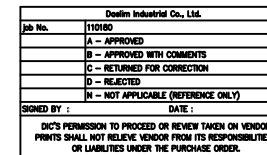
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VIETNAM OIL AND GAS GROUP (VNG)			FICHTNER GmbH & Co. KG FICHTNER PV POWER POC						
EPC CONTRACTOR			EPC CONTRACTOR'S CONSULTANT						
PETROVIETNAM CONSTRUCTION JOINT STOCK COMPANY (PVC)			WorleyParsons WORLEYPARSONS						
POWER ISLAND PACKAGE SUPPLIER			DAELIM DAELIM INDUSTRIAL CO., LTD.						
PROJECT TITLE									
THAI BINH2 THERMAL POWER PLANT 2 x 600MW									
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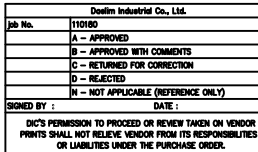
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D - REJECTED	
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SIGNED BY :	DATE :
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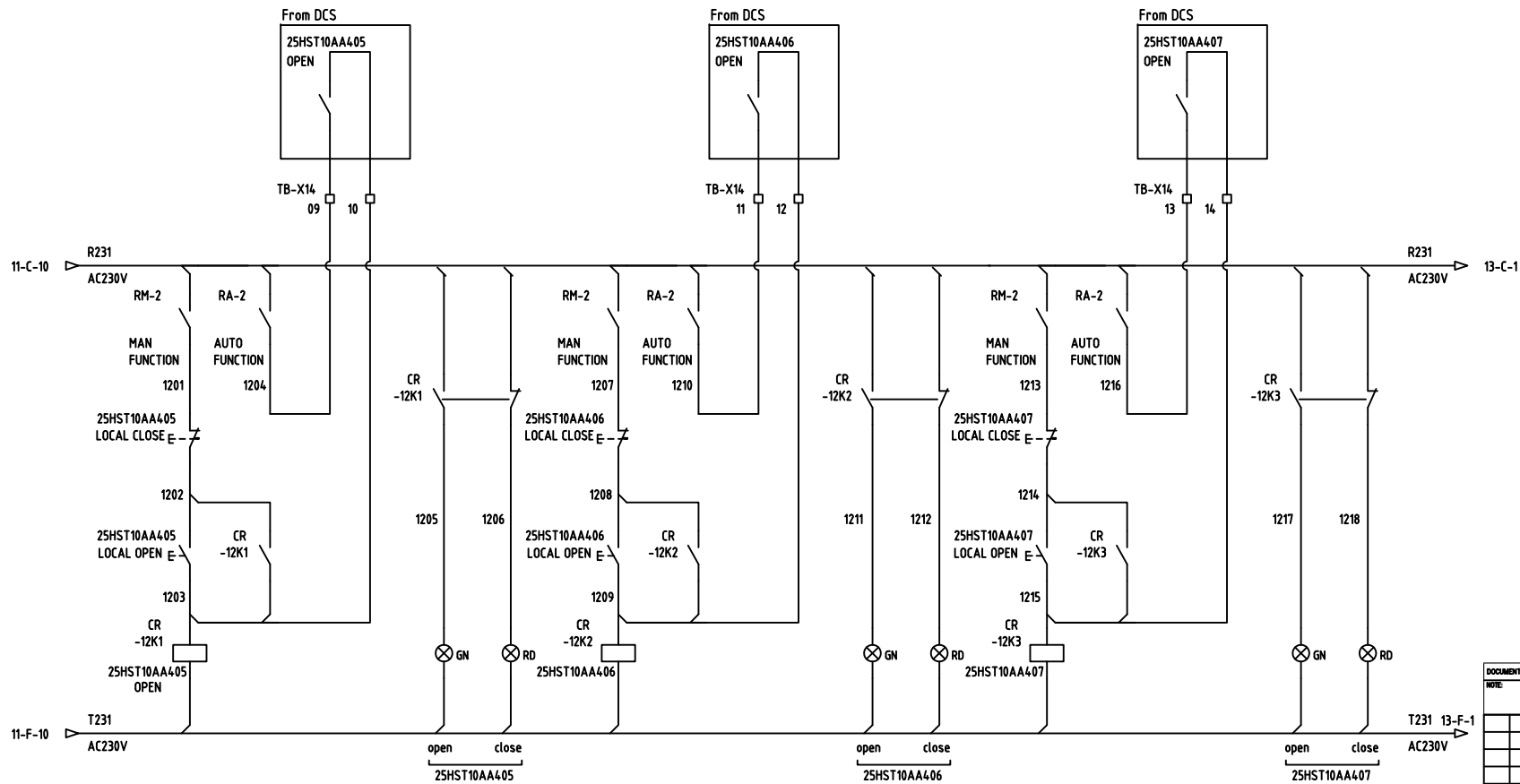
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EPC CONTRACTOR				EPC CONTRACTOR'S CONSULTANT					
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EPC CONTRACTOR		 PERENNIMUM CONSTRUCTION JOINT STOCK CORPORATION (PCJ)		EPC CONTRACTOR'S CONSULTANT  WorleyParsons <small>an energy company</small> WORLEYPARSONS					
POWER ISLAND PACKAGE SUPPLIER		 SOJITZ CORPORATION		 DAELIM DAELIM INDUSTRIAL CO., LTD.					
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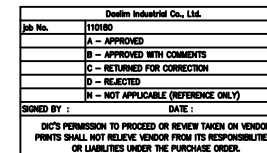
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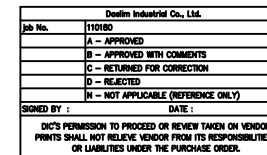


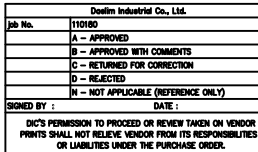
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EPC CONTRACTOR			EPC CONTRACTOR'S CONSULTANT						
WorleyParsons			WorleyParsons						
POWER ISLAND PACKAGE SUPPLIER			DAELIM INDUSTRIAL CO., LTD.						
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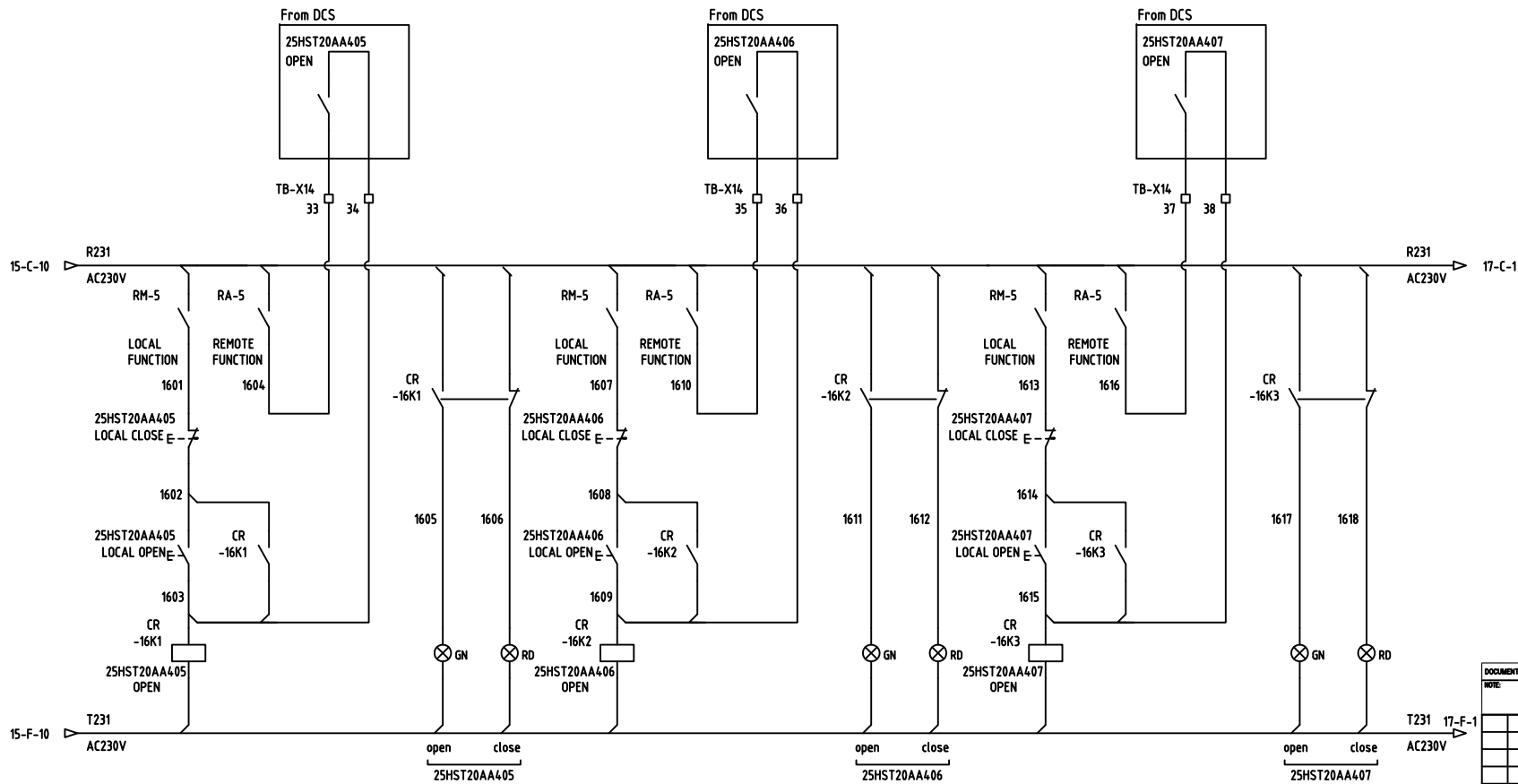
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Job No.	110180
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B - APPROVED WITH COMMENTS	
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D - REJECTED	
N - NOT APPLICABLE (REFERENCE ONLY)	
SIGNED BY :	DATE :
DICS PERMISSION TO PROCEED OR REVIEW TAKEN ON VENDOR PRINTS SHALL NOT RELIEVE VENDOR FROM ITS RESPONSIBILITIES OR LIABILITIES UNDER THE PURCHASE ORDER.	



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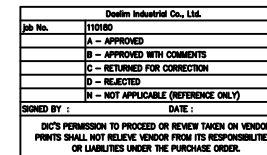
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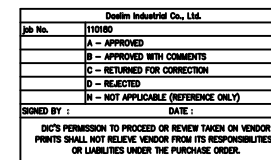


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EPC CONTRACTOR: VIETNAM OIL AND GAS GROUP (VNG) WORLEYPARSONS																													
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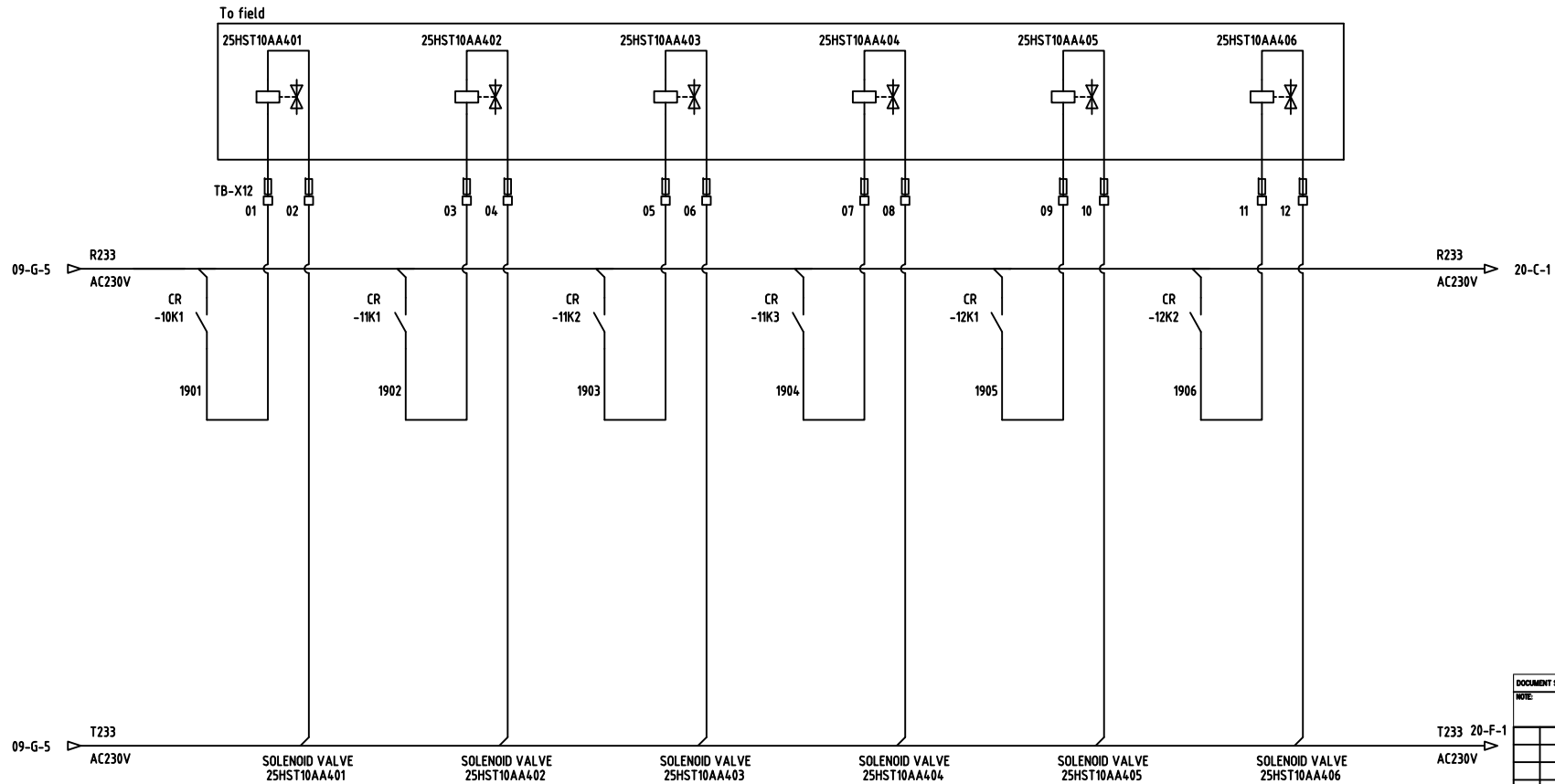
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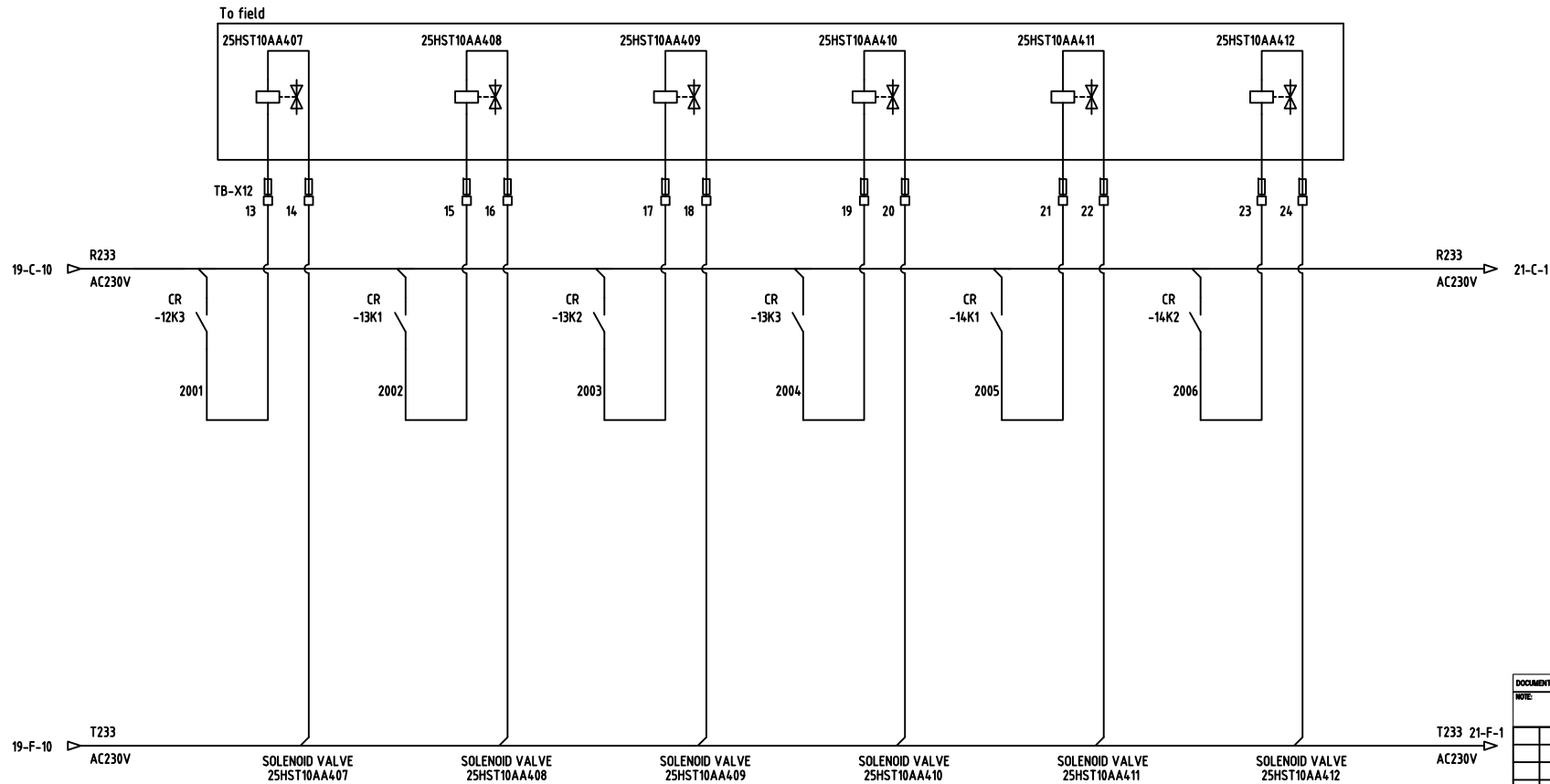
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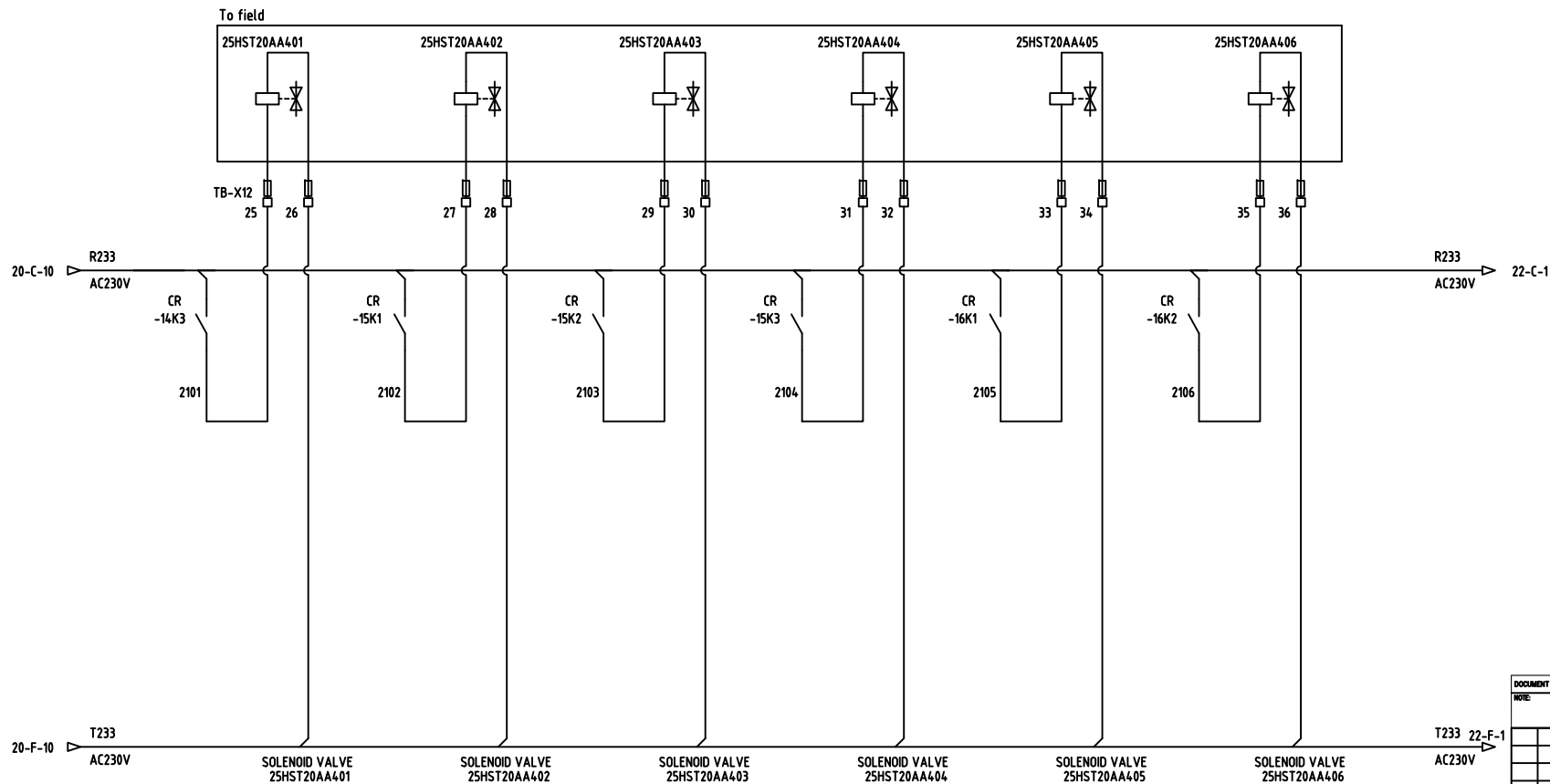
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EPC CONTRACTOR:  VIETNAM OIL AND GAS GROUP (VNG)  WorleyParsons									
POWER ISLAND PACKAGE SUPPLIER:  SOJITZ CORPORATION  DAELIM INDUSTRIAL CO., LTD.									
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SIGNED BY :			DATE :			JOB NO.			REVISION
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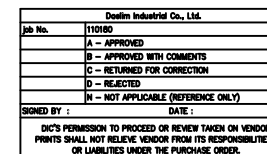


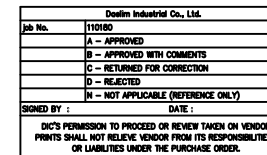
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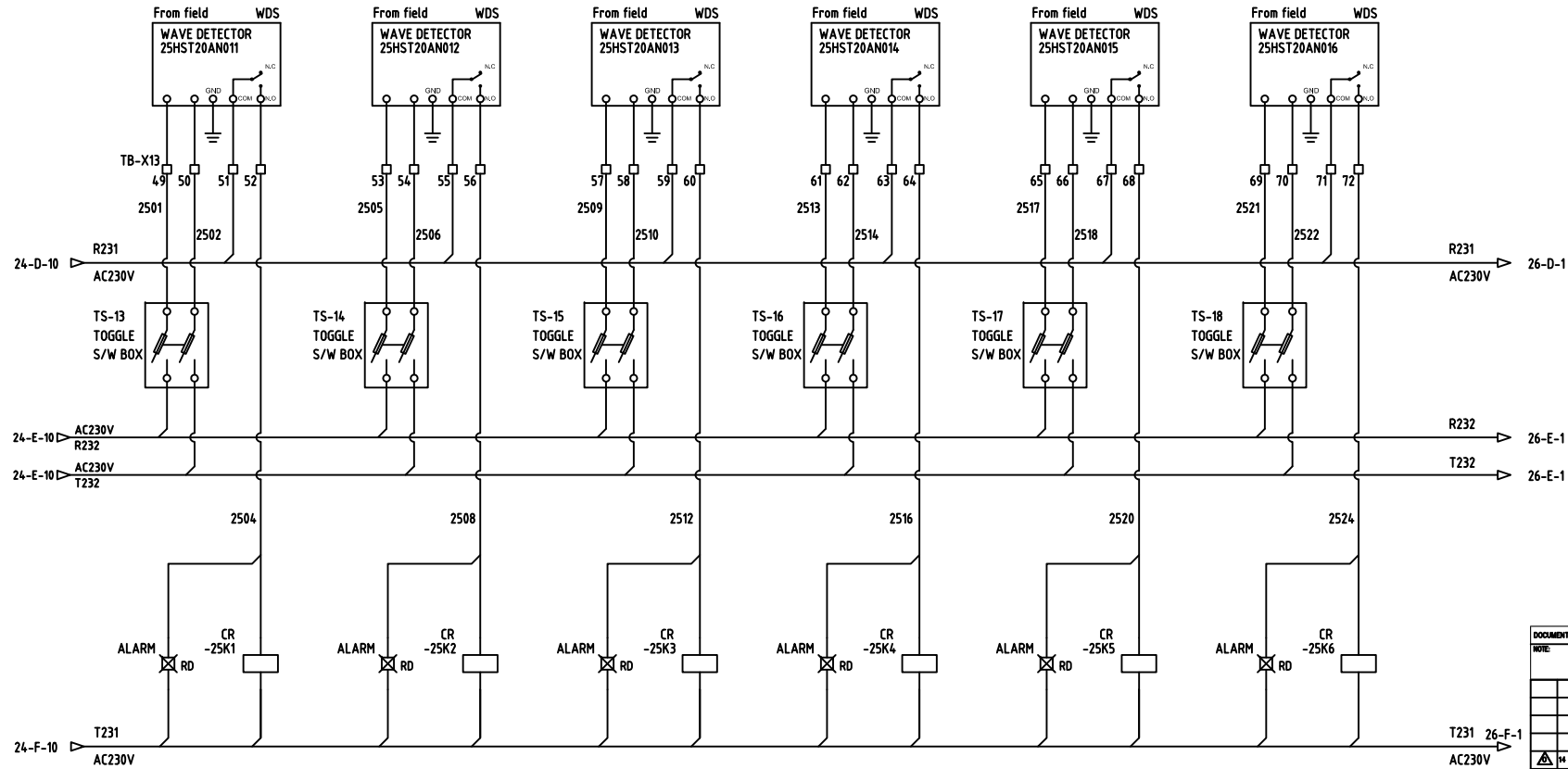


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POWER ISLAND PACKAGE SUPPLIER:  SOJITZ CORPORATION  DAELIM INDUSTRIAL CO., LTD.																													
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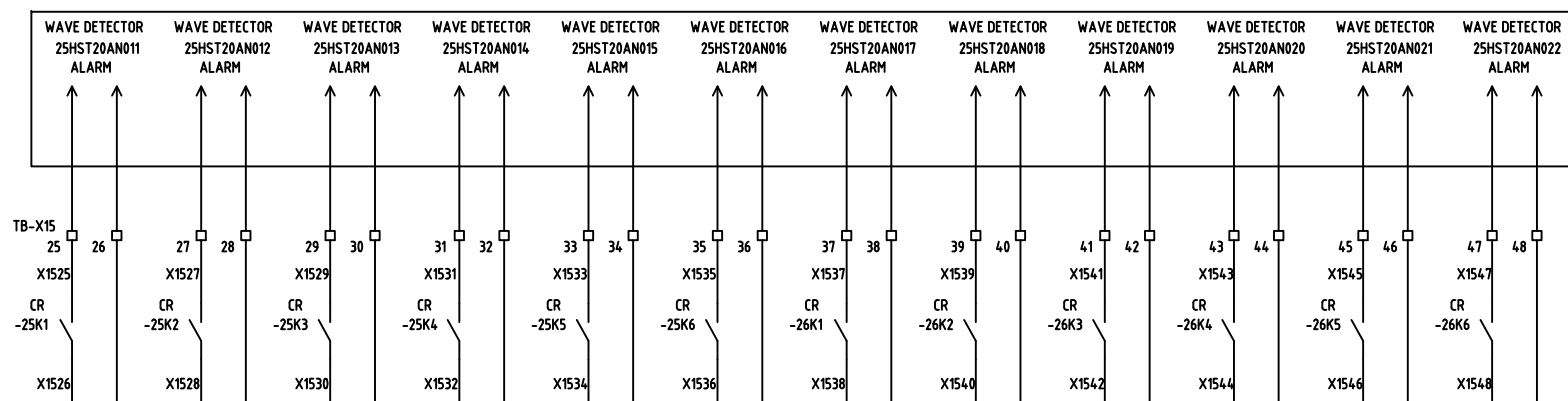


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To DCS

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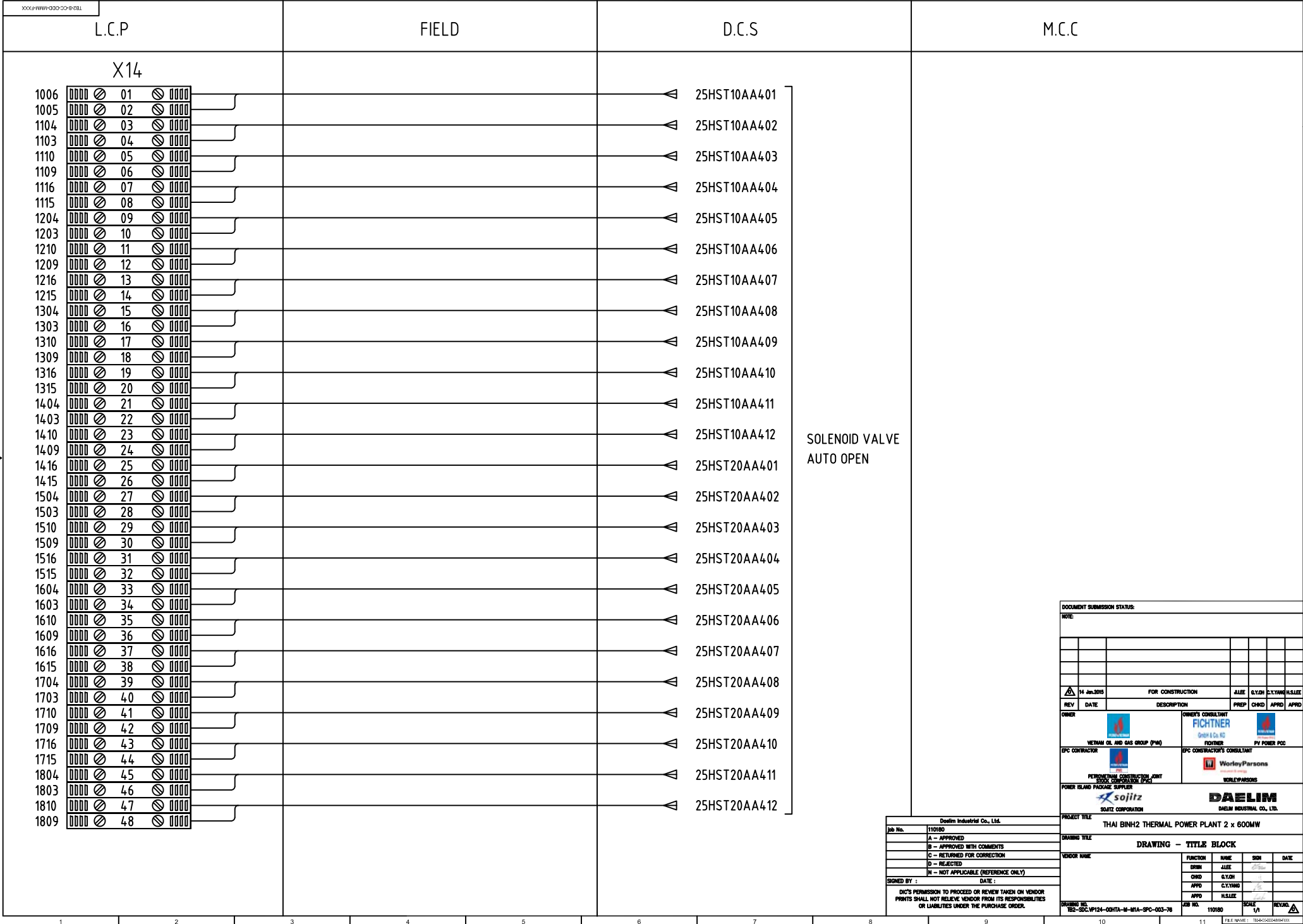
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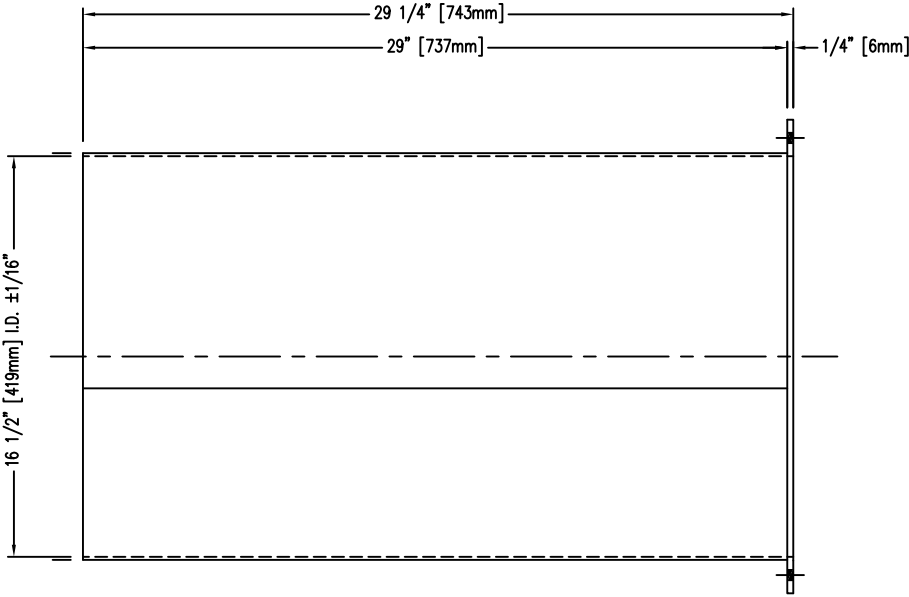
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EPC CONTRACTOR		EPC CONTRACTOR'S CONSULTANT					
		 Worktop Parsons <small>a wholly owned subsidiary of</small> WOLFE PARSONS					
PERMANENTAL CONSTRUCTION JOINT WORK CORPORATION (PJCI)							
POWER ISLAND PASSAGE SUPPLIER							
 SOJITZ CORPORATION		 DAELIM INDUSTRIAL CO., LTD.					
PROJECT TITLE							
THAI BINH2 THERMAL POWER PLANT 2 x 600MW							
DRAWING – TITLE BLOCK							
DRAWING NAME		FUNCTION	NAME	SIGN	DATE		
		DRAW	AJEE				
		CHECK	G.Y.H				
		APPD	C.O.Y.HAD				
		APPD	N.S.JIE				
DRAWING NO.		JOB NO.	110380	SCALE	1/1		
T02–SOC.VP124-DGHTA-M-WIA-SFC-033-TS							

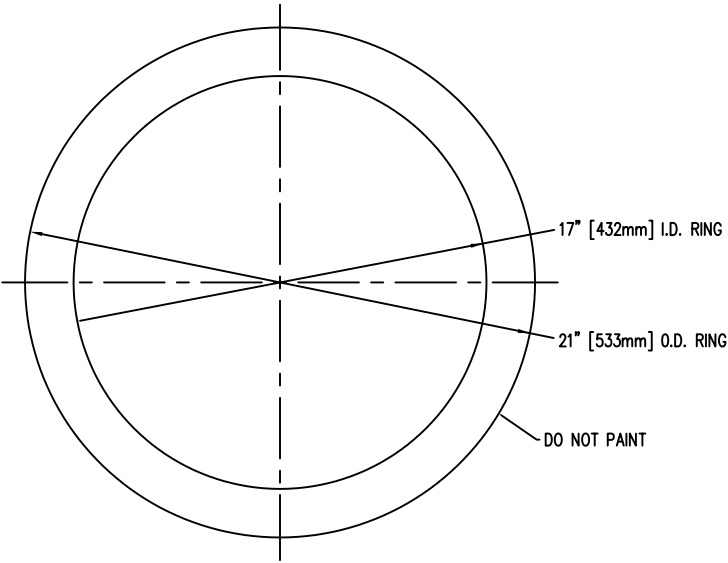


Mounting Tube

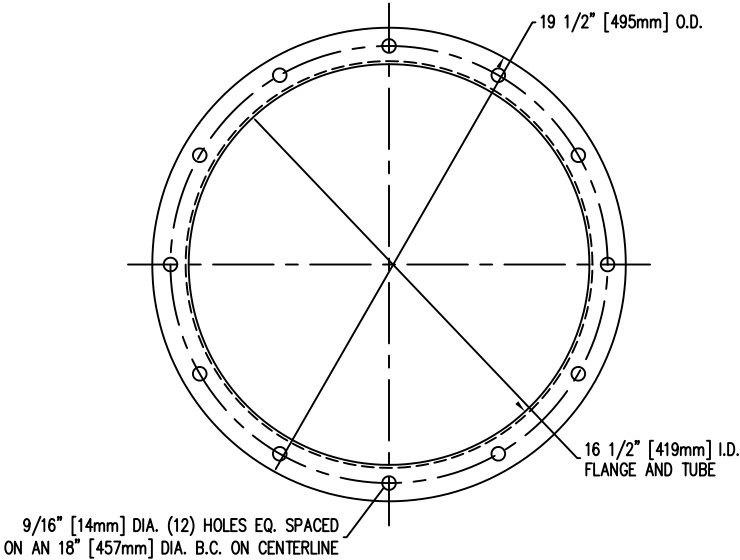


MOUNTING TUBE W/ MOUNTING FLANGE
PART NO. 823-0194-100

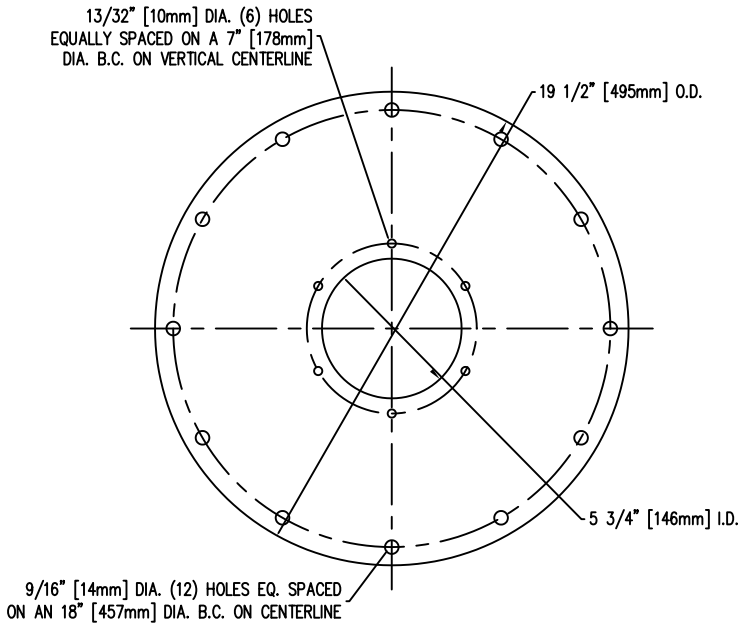
WEIGHT: 52#



RETAINER RING PART NO. 823-0194-400

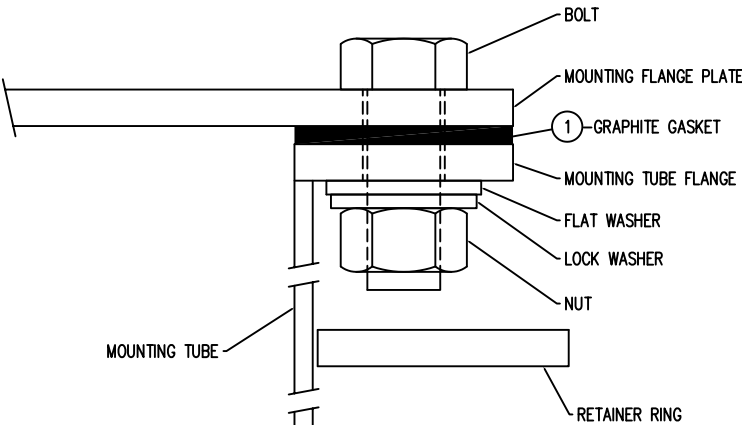


TUBE FLANGE PART NO. 823-0194-200



MOUNTING FLANGE PLATE
PART NO. 823-0194-300

WEIGHT: 19#



ASSEMBLY 142112

1	1	823-0218-100	GRAPHITE GASKET	D 823-0218
QTY.	ITEM NO.	PART NO.	DESCRIPTION	DRAWING NUMBER
	CUSTOMER:			DRAWN BY
	LOCATION:			DATE
	CUSTOMER EQUIPMENT ID:			CHECKED BY
	CUSTOMER I.D. NO:			DATE
	CUSTOMER P.O. NO:			APPROVED BY
				DATE
	BHA ORDER NO:			SCALE
	BHA PROJECT NO:			N.T.S.
				SIZE
				D
				SHT 1 OF 1
				REV.
				823-0194