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LAMPIRAN

Lampiran 1. Foto pengambilan data kapal

1.1. Pengukuran panjang

1.2. Pengukuran tinggi

1.3. Pengukuran lebar

1.4. Pengukuran kemiringan tanah dengan jangka sederhana

Lampiran 2. Perhitungan excel

2.1.Berat kapal

TOTAL MATERIAL TERPASANG			
No.	KOMPONEN	JUMLAH MATERIAL TERPASANG (Cm3)	JUMLAH MATERIAL TERPASANG (m3)
1	FRAME	4027828.4	4.03
2	GADING TEGAK	112459.5	0.11
3	BALOK GELADAK	1073617.8	1.07
4	GALAR	606749.3	0.61
5	BALOK PENGUAT	976670.8	0.98
6	KULIT	5830259.9	5.83
7	TRANSOM	208000.0	0.21
8	GADIG BELAKANG	64406.9	0.06
9	KULIT GELADAK	1722219.2	1.72
	TOTAL	14622211.6	14.62

	volume	8636181.63	cm3		
		829.688163	m3		2.924442
		832.6126053	m3		17.55
					18.24852
			2.737278003		
			20.98579803		

TOTAL MATERIAL TERPASANG BANGUNAN ATAS			
No.	KOMPONEN	JUMLAH MATERIAL TERPASANG	JUMLAH MATERIAL TERPASANG
1	TAMPAK KANAN	346542.0	0.35
2	TAMPAK KIRI	3465100.5	3.47
3	DEPAN	232674.0	0.23
4	BELAKANG	226800.0	0.23
5	BALOK MEMANJANG	316120.8	0.32
6	BALOK MELINTANG	755256.0	0.76
7			
8			
9			
	TOTAL	5342493.3	5.34

		TOTAL	19.96
			20.763293

2.2 Perhitungan matematis

Beban kritis							
	F=K/S			F perhitungan	151811.712	N	
	$K = \dfrac{\pi^2 \; x \, E \, x \, I}{Sk^2}$				15480.24	Kg	
	E =	2.05E+11					
	I =	4.90625E-06					
	Sk =	3					
	K =	1101844.535					
	S =	3.5					
	F	314812.7242	N		2.073705		

Tekanan kerja							
	P=F/A						
	A=phi.r^2						
	A1 =	78.5	cm^2				
		0.00785	m^2				
	A2 =	58.875	cm^2				
		0.0058875	m^2		6.25	25	18.75
	P	197.2005096	kg/cm^2				
		193.387	bar	tek. Masuk saluran 1			

Psaluran kembali		
P=Patm (ρ . g . h)		
Patm=	101325	
rho=	890	
g=	9.81	
h=	0.3	
ρ . g . h	2619.27	
P =	98705.73	Pa
	0.9870573	Bar

Volume silinder							
	V=A.S		Plangkah	150	cm		
	V1=	11775	0.011775	m^3		1000000	
	V2=	8831.25	0.008831	m^3			
debit aliran							
	Q=V.A						
	V=	6.67 x 10^-3	0.00667				
					Aselang	0.0000127	
	Q1	5.23595E-05	3.144	v1	4.122795		
	Q2	3.92696E-05	2.34	v2	3.092096		

2.3. Moody diagram
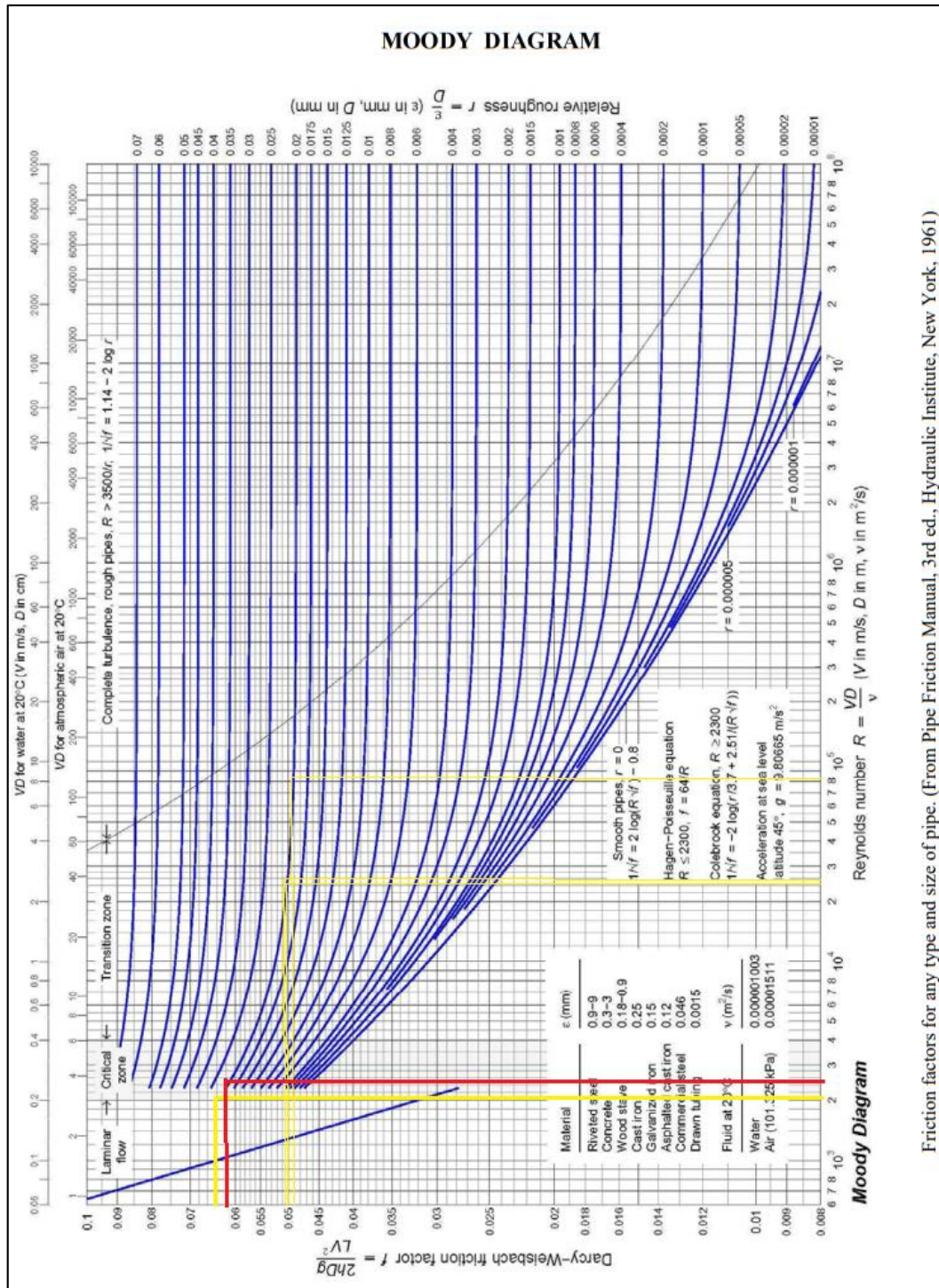
Friction factors for any type and size of pipe. (From Pipe Friction Manual, 3rd ed., Hydraulic Institute, New York, 1961)

2.4. Perhitungan head loss

Head loss suction					
	$\Delta \text{hs} = (f.\dfrac{L}{D} + K + f(Coeff\,valve + 3.\,Coeff\,elbow)).\dfrac{v^2}{2.g}$				
f1	0.051003				
f2	0.049526				
L1	0.4456		44.56	cm	
L2	0.4758		47.58	cm	
D	0.0127				
v1	4.122795276				
v2	3.092096457				
g	9.81				
K	0.75				
Cl	30				
Cv	150				
$\Delta \text{hs}1 =$	1359.832348	m			
$\Delta \text{hs}2 =$	749.296383	m			

Head loss discharge				
$\Delta \text{hd}_1 =$	$(f.\dfrac{L1}{D} + f(4.\,Coeff\,elbow)).\dfrac{v1^2}{2.g}$			
$\Delta \text{hd}_2 =$	$(f.\dfrac{L2}{D} + f(4.\,Coeff\,elbow)).\dfrac{v2^2}{2.g}$			
L1=	0.7331			
L2 =	2.2232			
$\Delta \text{hd}_1 =$	755.7277211	m		
$\Delta \text{hd}_2 =$	685.3011864	m		

2.5. Perhtungan head total

Head total			
$He = $	$\dfrac{p2-p1}{\rho \cdot g} + \dfrac{v^2}{2 \cdot g} + h + hlt$		
P1	1.01325		
P2	193.387	sal 1	
	0.9870573	sal 2	
V	4.122795276	sal 1	
	3.092096457	sal 2	
rho	890		
h	0.3		
hlt	2115.560069	sal 1	
	1434.597569	sal 2	
He1	2199.25455	m	
He2	1481.794568	m	

2.6. Perhitungan daya pompa

Daya pompa				
$P_{sh} = \rho \cdot g \cdot Q \cdot He$				
Q	0.0000524	Q1		
	0.000043	Q2		
g	9.81			
Psh	1006.157109	watt	1.006157	Kw
	556.3082084	watt	0.556308	Kw

2.7. Penentuan dimensi tangki

Tangki (reservoir)				
	$V = (3 \times Q) + (3 \times Q \times 10\%)$			
	Q = Q1+Q2			
	Q1	3.144		
	Q2	2.34		
		5.484	16.452	
		1.6452		
		18.0972		
	Vhitung	18097.2		
tangki rancangan				
	p	30		
	l	25		
	t	30		
	Vrencana	22500	>	18097.2

Lampiran 3. Perancangan desain dengan autocad

3.1. Perancangan sistem pendorong hidrolik
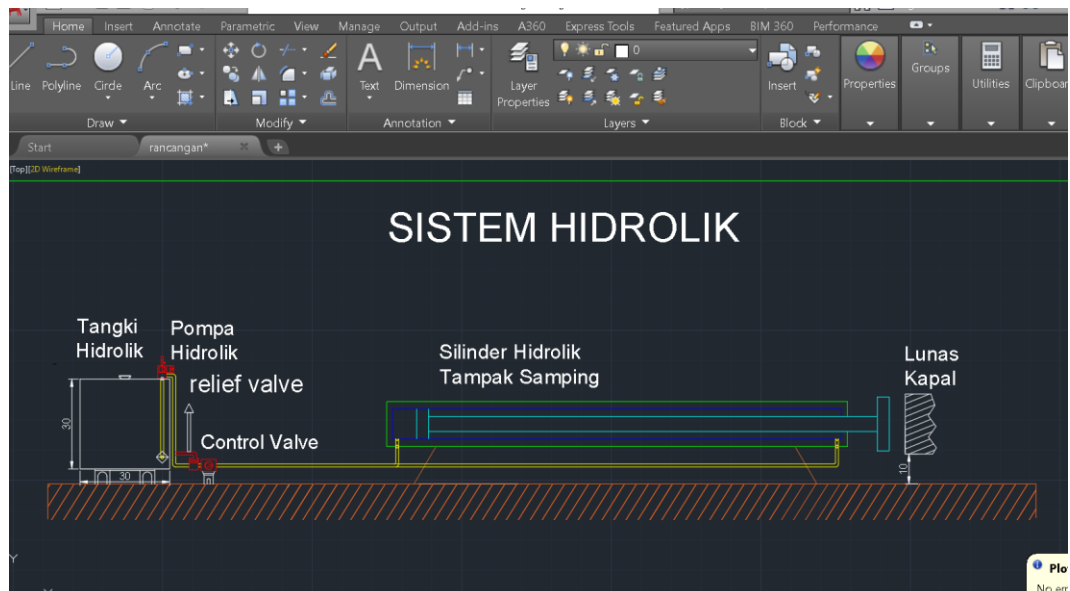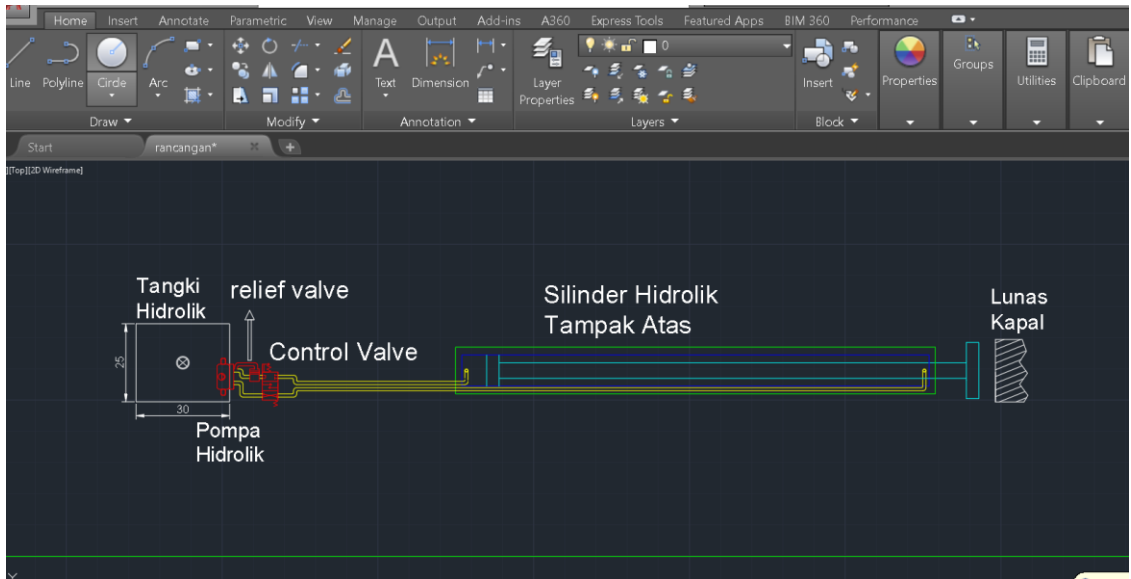
3.2. Penempatan tangki
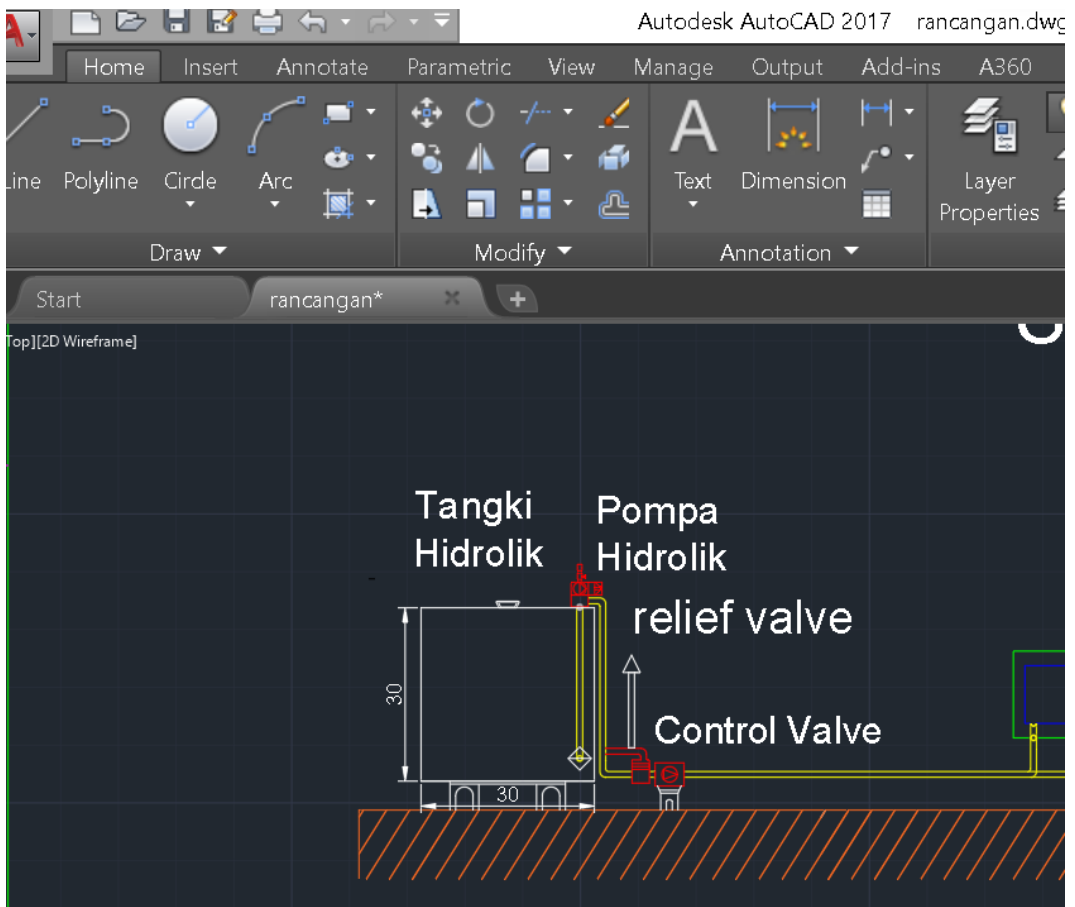
3.3. Peletakan silinder sejajar lunas kapal
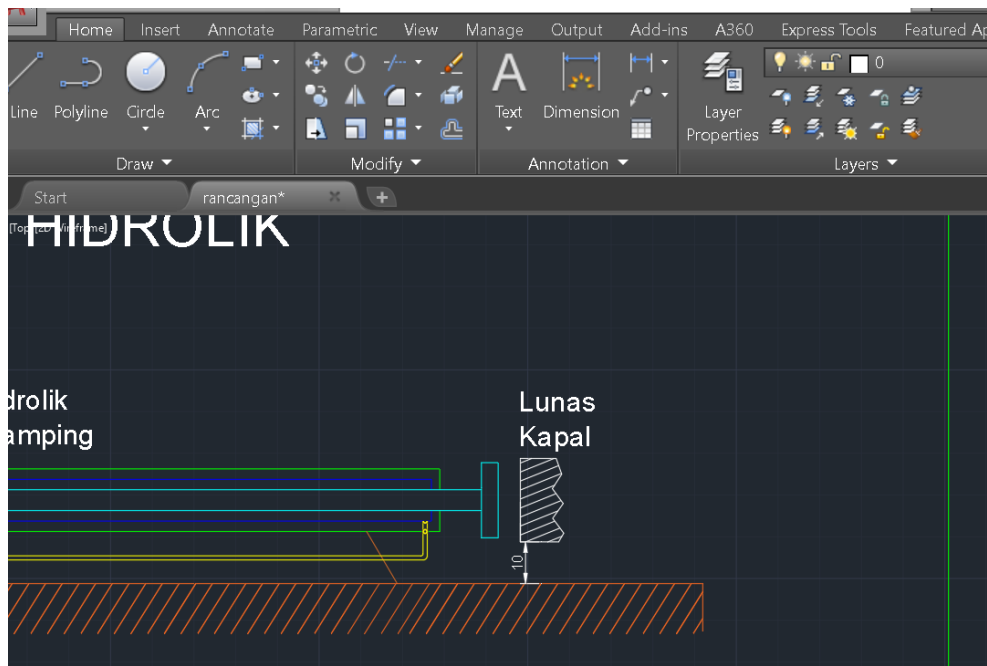
3.4. Perencanaan silinder
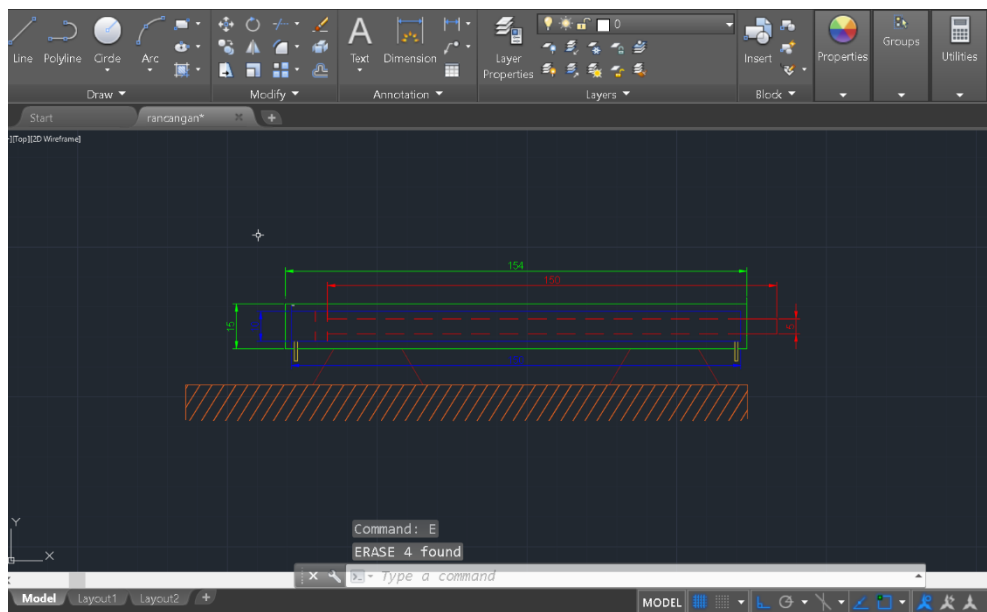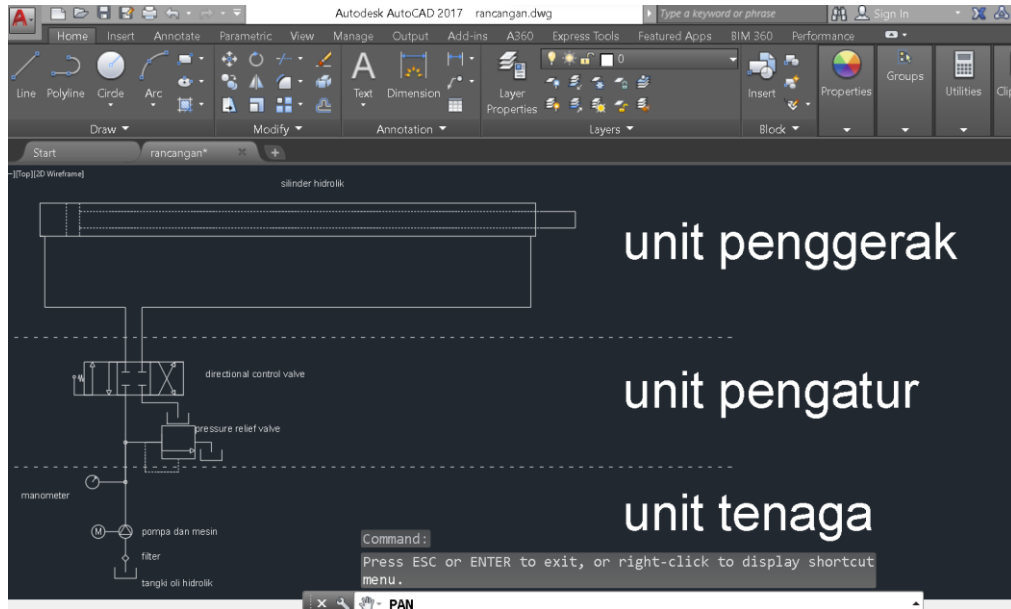
3.5. Peletakan pompa dan katup
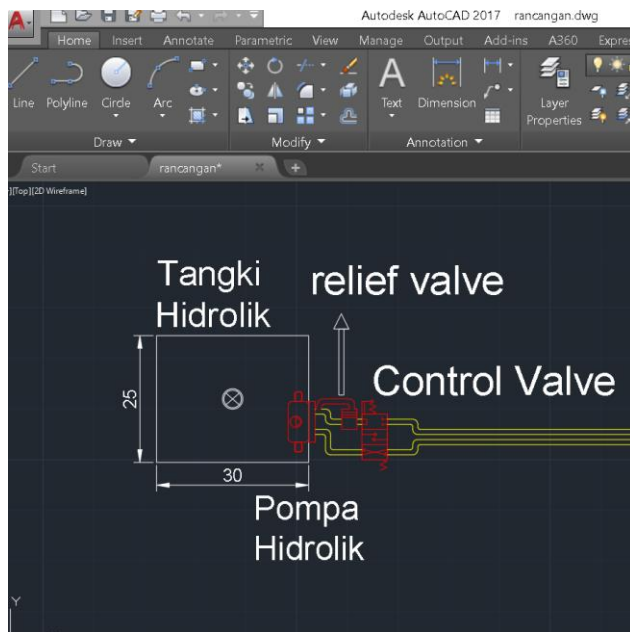
3.6. Perancangan penguat dudukan silinder hidrolik
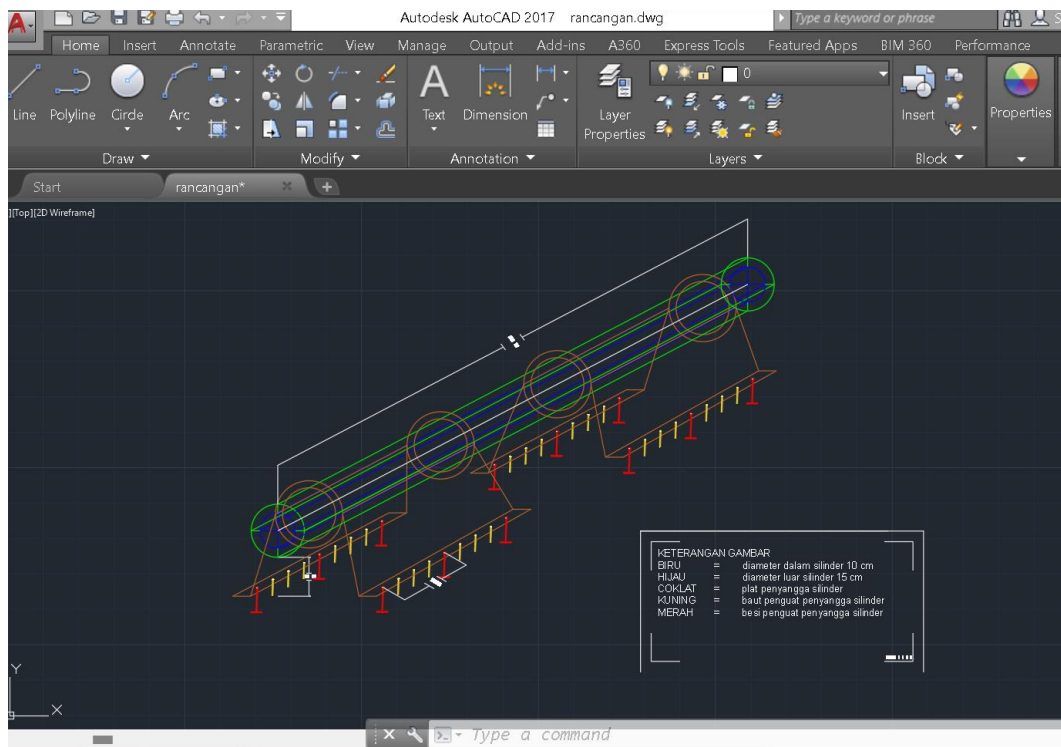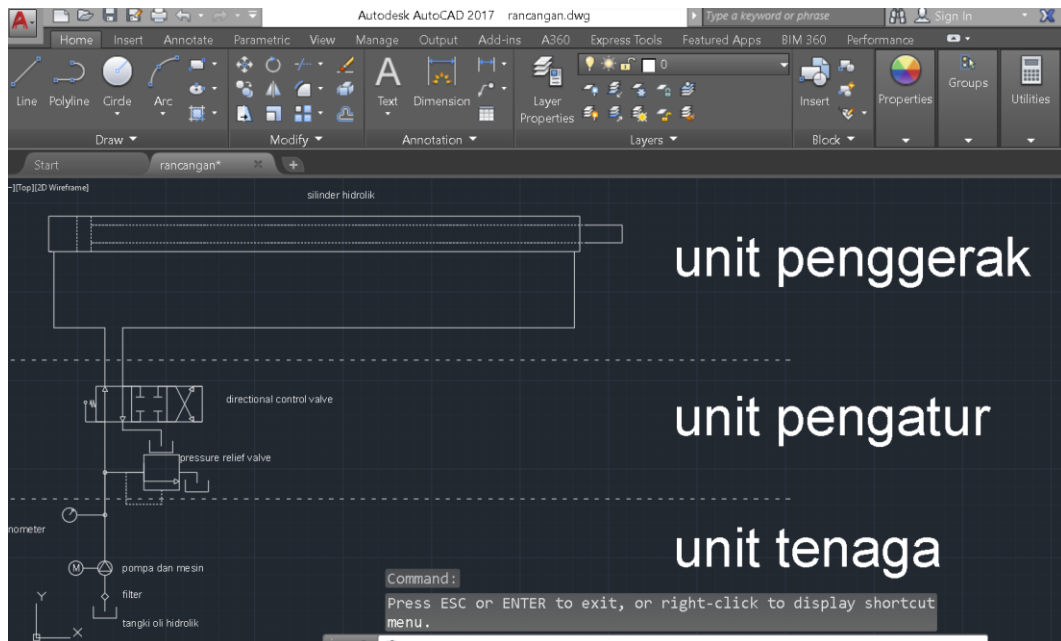
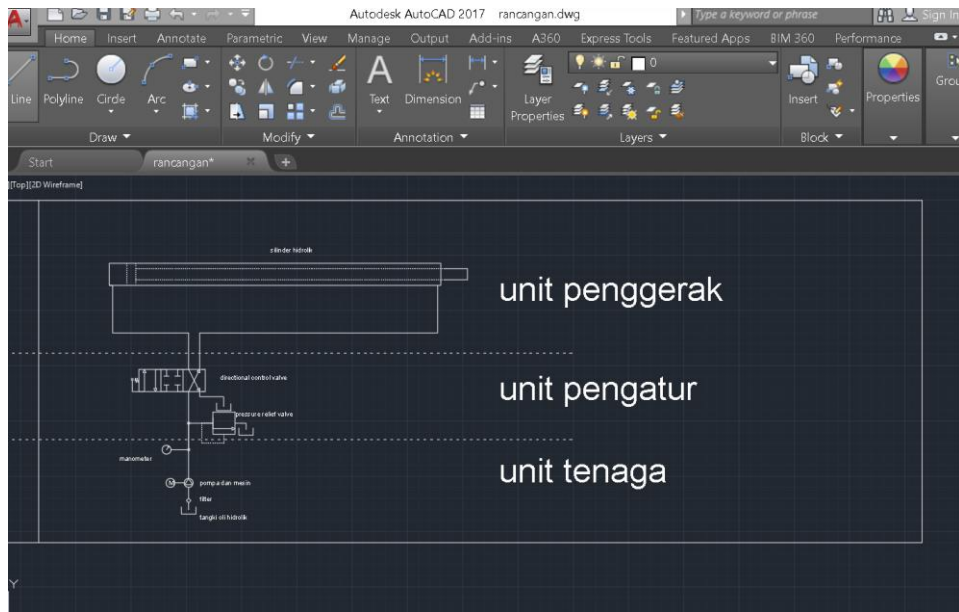Lampiran 4 Diagram sistem pendorong hidrolik

4.1. Diagram Sistem Posisi tertutup

4.2. Diagram Sistem Posisi terbuka

4.3. Diagram Sistem Posisi balik

Lampiran 5 Brosur Komponen Sistem Pendorong

5.1. Brosur silinder hidrolik

LIFTING TOOLS
HYDRAULIC CYLINDERS

BARTON TOOLS

Double-acting General Purpose Cylinders

Working pressure : 700bar

Versatile, rugged cylinders for tough job site uses and high-cycle industrial uses

Characteristics:
- Double-acting for rapid piston retraction.
- High strength alloy steel for durability.
- Chrome plated piston resists wear and corrosion.
- Baked enamel finish for increased corrosion resistance.
- Dust wiper on piston rod reduces contamination.
- Grooved piston rods require no saddle.
- Each cylinder has two HH-II R2 3/8 male half couplers and dust caps.

HHYG cylinder is the best solution to precise o

HHYG hydraulic synchronous lifting system are being used to separate the reducer and rolling press.

Model	Cylinder Capacity @700 bar			Stroke (mm)	Effective area (cm²)	
	Ton	Push (KN)	Pull (KN)		push	pull
HHYG-10250S HHYG-10300S	10	137	70	250 300	19.6	10
HHYG-20250S HHYG-20300S	20	198	110	250 300	28.3	15.7
HHYG-30200S HHYG-30300S	30	309	172	200 300	44.2	24.6
HHYG-50200S HHYG-50300S	50	496	227	200 300	70.8	32.4
HHYG-100200S HHYG-100300S	100	1002	557	200 300	143.1	79.5
HHYG-20050S HHYG-200150S HHYG-200300S	200	1984	982	50 150 300	283.4	140.3
HHYG-25050S HHYG-250150S HHYG-250300S	250	2540	760	50 150 300	362.9	108.5
HHYG-30050S HHYG-300150S HHYG-300300S	300	3165	967	50 150 300	452.2	138.2
HHYG-40050S HHYG-400150S HHYG-400300S	400	4006	1346	50 150 300	572.3	192.3
HHYG-50050S HHYG-500150S HHYG-500300S	500	5111	1677	50 150 300	730.2	239.6
HHYG-60050S HHYG-600150S HHYG-600300S	600	5984	1978	50 150 300	854.9	282.6
HHYG-80050S HHYG-800150S HHYG-800300S	800	8358	2731	50 150 300	1194	390.1
HHYG-100050S HHYG-1000150S HHYG-1000300S	1000	10161	3039	50 150 300	1451.5	434.1

BARTON TOOLS

www.barton-tools.com

BARTON TOOLS

Pump Selection
A double-acting cylinder must be powered by a two-way hydraulic pump

Oil capacity (cm³)		Closed height A (mm)	Extended Height B (mm)	Outside Dia. D (mm)	Inside Dia. E (mm)	Piston Rod Dia. F (mm)	G.W. (Kg)	Handle	Recommended pump	Model
push	pull									
491	250	380	630	70	50	35	10	No		HHYG-10250S
589	300	430	730				11	No		HHYG-10300S
707	393	390	640	80	60	40	13	No		HHYG-20250S
848	471	440	740				15	No		HHYG-20300S
884	492	364	564	95	75	50	17	No		HHYG-30200S
1325	738	464	764				21	No		HHYG-30300S
1418	648	374	574	120	95	70	29	No		HHYG-50200S
2126	971	474	774				35	No	HHB-630B	HHYG-50300S
2863	1590	389	589	175	135	90	60	No		HHYG-100200S
4294	2384	489	789				73	No		HHYG-100300S
1418	702	217	267	228	190	135	63	Eye bolts		HHYG-20050S
4253	2105	317	467				84	Eye bolts		HHYG-200150S
8506	4210	467	767				146	Eye bolts		HHYG-200300S
1815	543	261	311	270	215	180	102	Eye bolts		HHYG-25050S
5446	1628	361	511				135	Eye bolts		HHYG-250150S
10892	3256	511	811				184	Eye bolts		HHYG-250300S
2262	691	280	330	285	240	200	133	Eye bolts		HHYG-30050S
6786	2072	380	530				173	Eye bolts		HHYG-300150S
13572	4145	530	830				231	Eye bolts		HHYG-300300S
2863	962	341	391	325	270	220	211	Eye bolts		HHYG-40050S
8588	2885	441	591				262	Eye bolts		HHYG-400150S
17177	5770	591	891				336	Eye bolts	HHB-630B-III	HHYG-400300S
3653	1198	376	426	372	305	250	309	Eye bolts		HHYG-50050S
10959	3594	476	626				360	Eye bolts		HHYG-500150S
21918	7189	626	926				460	Eye bolts		HHYG-500300S
4276	1413	397	447	402	330	270	381	Eye bolts		HHYG-60050S
12829	4239	497	647				458	Eye bolts		HHYG-600150S
25659	8478	647	947				575	Eye bolts		HHYG-600300S
5973	1951	438	488	472	390	320	583	Eye bolts		HHYG-80050S
17919	5852	538	688				681	Eye bolts		HHYG-800150S
35838	11704	688	988				850	Eye bolts		HHYG-800300S
7261	2171	493	543	530	430	360	830	Eye bolts	HHB-630B-III	HHYG-100050S
21783	6512	593	743				970	Eye bolts		HHYG-1000150S
43566	13023	743	1043				1177	Eye bolts		HHYG-1000300S

5.2. Brosur pompa hidrolik

NACHI

NASGP 300A External Gear Pump

Explanation of Model Number

NASGP - 300 A - * A - 9 H * − R - E10

- Design Number
- Clockwise Rotation
- Shaft Specification
  2: 5/8 Key   5: 9T spline
- 2 Bolt Mount
- Port Type: SAE O-ring
- Side Ported
- Max Pump Capacity (cc/rev)
  Nominal: 8, 10.5, 15, 19, 23
- Flange: SAE-A
- 300 Series
- Nachi American External Gear Pump

Note:

1. There are certain restrictions on pump capacity and motor capacity combinations.
2. Design numbers are subject to change without notice.
3. When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05 mm. Use a pump mounting base of sufficient rigidity. The angle error should be no greater than 1°.

Model No.	Pump Capacity (cm³/rev)	Pump Capacity (in³/rev)	Flow Rate @ 1800 rpm (gpm)	Rated Pressure (psi)	Maximum Pressure (psi)	Speed (rpm)	Weight (lbs)
NASGP-300A-8A-9H2-R-E10	8.00	0.48	3.80	3,600	4,200	500 - 3500	8.00
NASGP-300A-10.5A-9H2-R-E10	10.40	0.63	4.95				8.36
NASGP-300A-15A-9H2-R-E10	14.80	0.90	7.04				8.80
NASGP-300A-19A-9H2-R-E10	19.20	1.17	9.13				9.24
NASGP-300A-23A-9H2-R-E10	22.90	1.40	10.89				9.68

Note: Direction of rotation is clockwise when viewed from the shaft end.
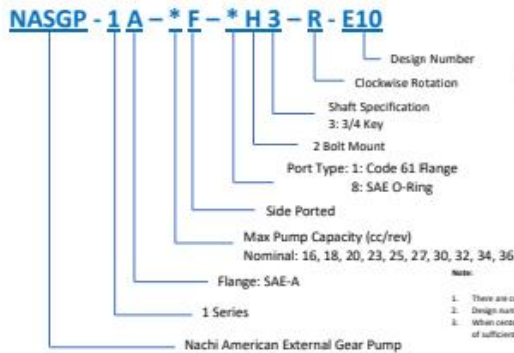
Allowable Specifications

Size	Displacement (in³)	A (in)	L (in)	ØD (in)
NASGP-300A-8	0.48	2.16	3.67	3.25
10.5	0.63	2.28	3.80	
15	0.90	2.52	4.04	
19	1.17	2.76	4.27	
23	1.40	2.95	4.47	

SAE J498b Involute Spline Data (Some dimensions are different from SAE Standard)			
No. of Teeth	9	Minor Diameter	Ø0.47 Max
Diametrical Pitch	16/32	Over Pin Diameter	0.735
			0.723
Pressure Angle	30°	Pin Diameter	Ø0.12
Major Diameter	Ø0.6085	Flat Root Side Fit	
	Ø0.6035		

	Front Pump	Rear Pump (Keyed)	Kit Number
NACHI Part Number	PVS-0B or PVS-1B Series	NASGP Series	PVMK-1-SAE-A-3/4"
	PVS-2B Series		PVMK-2-SAE-A-3/4"

NASGP 1A External Gear Pump

Explanation of Model Number

NASGP - 1 A – * F – * H 3 – R - E10

- Design Number
- Clockwise Rotation
- Shaft Specification
  3: 3/4 Key
- 2 Bolt Mount
- Port Type: 1: Code 61 Flange
  8: SAE O-Ring
- Side Ported
- Max Pump Capacity (cc/rev)
  Nominal: 16, 18, 20, 23, 25, 27, 30, 32, 34, 36
- Flange: SAE-A
- 1 Series
- Nachi American External Gear Pump

Note:

1. There are certain restrictions on pump capacity and motor capacity combinations.
2. Design numbers are subject to change without notice.
3. When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05 mm. Use a pump mounting base of sufficient rigidity. The angle error should be no greater than 1°.
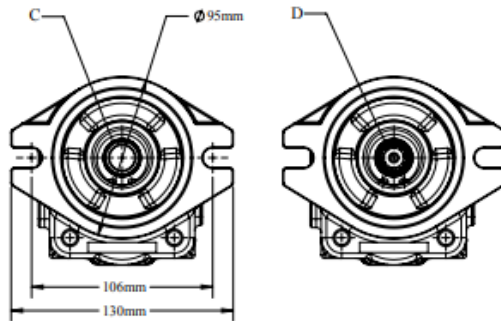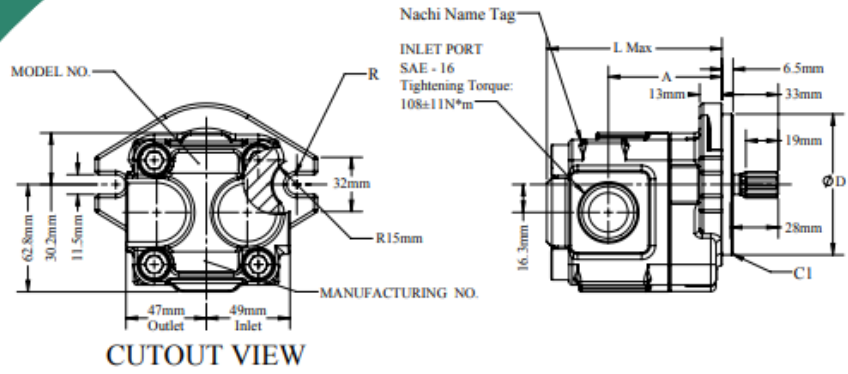
Model No.	Pump Capacity (cm³/rev)	Pump Capacity (in³/rev)	Flow Rate @ 1800 rpm (gpm)	Rated Pressure (psi)	Maximum Pressure (psi)	Speed (rpm)	Weight (lbs)
NASGP-1A-16F-8H3-R-E10	16.0	0.98	7.61				7.28
NASGP-1A-18F-8H3-R-E10	18.0	1.10	8.56				7.50
NASGP-1A-20F-8H3-R-E10	20.0	1.22	9.51				7.72
NASGP-1A-23F-8H3-R-E10	23.0	1.40	10.94				8.16
NASGP-1A-25F-8H3-R-E10	25.0	1.53	11.89				8.38
NASGP-1A-27F-8H3-R-E10	27.0	1.65	12.84	2,987	3,500	500 - 2,000	8.82
NASGP-1A-30F-8H3-R-E10	30.0	1.83	14.26				9.04
NASGP-1A-32F-8H3-R-E10	32.0	1.95	15.22				9.26
NASGP-1A-34F-8H3-R-E10	34.0	2.07	16.17				9.48
NASGP-1A-36F-8H3-R-E10	36.0	2.20	17.12				9.92

Note: Direction of rotation is clockwise when viewed from the shaft end.

Allowable Specifications

Size	Displacement (in³)	A (in)	L (in)	ØD (in)
NASGP-1A-16	0.98	3.86	4.78	
18	1.10	3.96	4.88	
20	1.22	4.06	4.98	
23	1.40	4.21	5.14	
25	1.53	4.27	5.20	3.25
27	1.65	4.41	5.33	
30	1.83	4.51	5.43	
32	1.95	4.67	5.59	
34	2.07	4.70	5.63	
36	2.20	4.82	5.75	

	Front Pump	Rear Pump (Keyed)	Kit Number
NACHI Part Number	PVS-0B or PVS-1B Series	NASGP Series	PVMK-1-SAE-A-3/4"
	PVS-2B Series		PVMK-2-SAE-A-3/4"

MODEL NO.

R

32mm

R15mm

62.8mm
30.2mm
11.5mm

47mm
Outlet

49mm
Inlet

MANUFACTURING NO.

CUTOUT VIEW

Nachi Name Tag

INLET PORT
SAE - 16
Tightening Torque:
108±11N*m

L Max

A

13mm

6.5mm

33mm

19mm

Ø D

16.3mm

28mm

C1

C

Ø 95mm

D

106mm

130mm

NACHI
NACHI AMERICA INC.

5.3. Brosur Pressure Relief Valve

Leading the way in pressure relief technology

Product Overview - Pressure Relief Valves
The premier option for pressure relief devices. Technology leadership with reliable and efficient overpressure protection.

EMERSON.

Anderson Greenwood
Series 81P

The Type 81P is specifically designed for liquid applications. Naturally balanced against backpressure, its stabilizing ring prevents destructive chattering, common on liquid applications.

Soft seat as standard (PTFE, PCTFE).

Technical Data
Sizes:
½ x 1 to 2 x 3 in.
[DN 15 x 25 to 50 x 80]

Set Pressures:
50 to 6000 psig [3.4 to 414 barg]

Temperature Range:
-65 to 400°F [-54 to 205°C]
Special version available to -320°F [-196°C]

Connections:
Threaded NPT
Flanges ANSI or EN
Hub connections

Applications
Low to medium pressure gas and liquid.

Thermal relief applications.

CO_2 systems, natural gas transmission.

Global Standards
ASME Section VIII
ISO EN4126

5.4. Brosur Directional Control Valve

DCVO3 Solenoid Valves

www.comatrol.com

Comatrol
RESPONSIVENESS IN MOTION
Member of the Danfoss Group

DCV03 Solenoid Valves Catalog

OVERVIEW
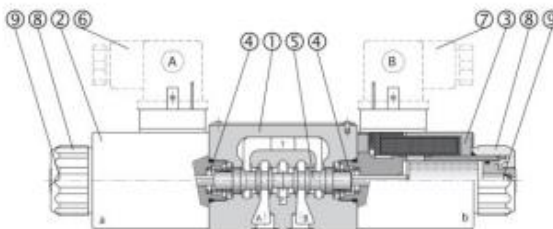
DCV 03 directional control valves consist of: housing (1), control spool (5), with two centering springs (4), and cylindrical operating solenoids (2, 3).

The three-position directional valves have two solenoids and two springs. Two-position directional valves have either one solenoid and one return spring or two solenoids and a detent assembly.

The operating solenoids are DC. For AC supply the solenoids are provided with a rectifier, which is integrated directly into the coil.

The plug connectors (6, 7) can be rotated 90°. By loosening the nut (8), the solenoids can be rotated 360°. This enables the solenoids to be replaced without opening the valves.

In the case of solenoid malfunction or power failure, the spool can be actuated by manual override (9), provided the pressure in T-port does not exceed 25 bar [360 psi].

The valve housing (1) is phosphate coated. The operating solenoids (2, 3) are zinc coated.
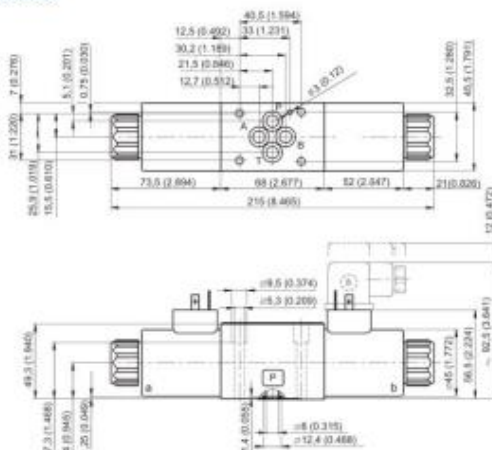
FEATURES

- 3 position, 4-way, and 2 position, 4-way directional valves

- Cylindrical operating solenoids with separate operating coils – connector can be rotated 90°

- 4-land spool – reduced functional dependence on fluid viscosity

- Push button manual override

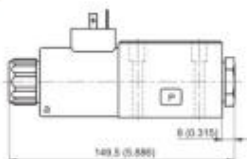- Installation dimensions to ISO 4401-03-02-0-94 and DIN 24340-A6

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RESPONSIVENESS IN MOTION
Member of the Danfoss Group

DIMENSIONS

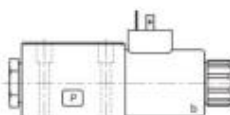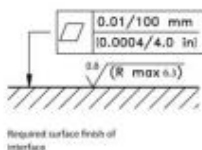Dimensions: mm [in]

Valve with two solenoids

Valve with one solenoid – size a

Functional symbols
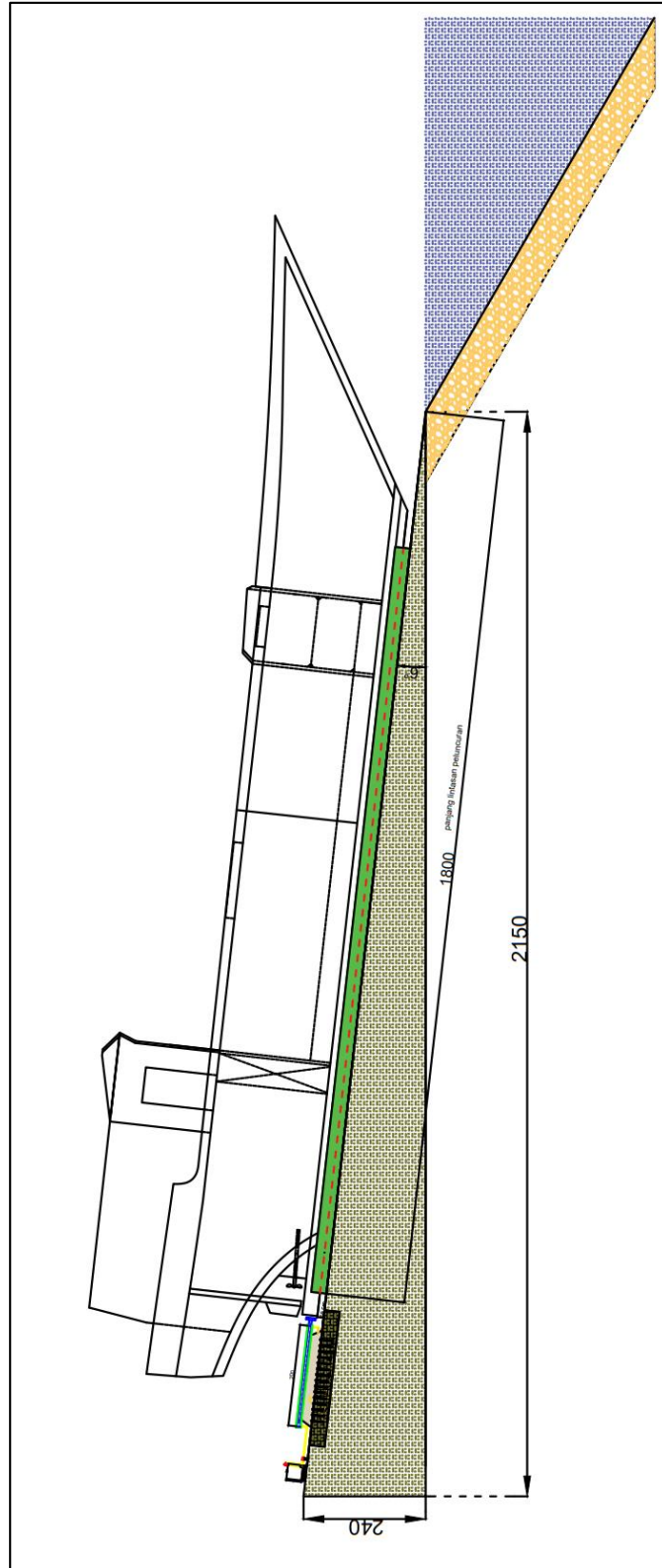R11, R21, Y51, C51, H51, J15

Valve with one solenoid – size b

Functional symbols
X11, H11, K11


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0.01/100  mm
[0.0004/4.0  in]
0.8 / (R max 6.3)
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Required surface finish of
interface

D3 - DCV03 Solenoid Valves

Lampiran 6 Posisi peluncuran kapal

6.1. Posisi kapal diatas balok luncur

6.2. Peletakan silinder sejajar dengan lunas kapal