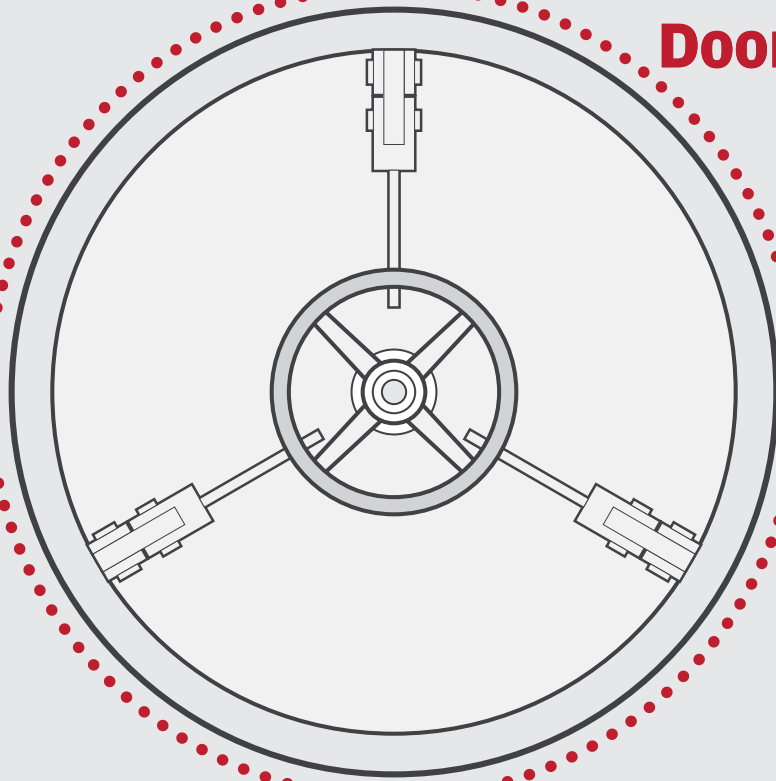




**Marine
Doors & Hatches**





FF began 20 years ago as a specialty forging company providing custom technical solutions in specialty materials to solve our clients most demanding requirements. We have since expanded our areas of operation, but all are under-pinned by our core expertise in material sourcing, precision manufacturing, advanced quality controls and the delivery of technically superior, forward looking custom solutions in exotic materials.

We pride ourselves in our customer service and sterling reputation in the market. We are an ISO 9001:2008 certified manufacturer as well as AS 9100 Rev C, ASME U-Stamp, and OHSAS 18001 approved. We have over 250,000 square feet of manufacturing facilities around the globe.

Our sub-units, JVs and collaborations include:

- **FFPL (Flash Forge Private Limited)** Custom solutions for Power, Marine, Aerospace and Defence
- **FF Coyard** Custom valves for critical application
- **FF Process Equipment** Custom fabrication of Heat Exchangers, Piping, and Pressure Vessels.
- **FF Composite Resin Developments (CRD)** Industry leading composite fittings, valves, pumps and custom solutions
- **FF Optimal Armour** Premiere composite anti-ballistic solutions
- **FF USA** Bringing our products to the Americas
- **Nereides** Supply and maintenance of buoyant cable antennae



Doors and Hatches

FF is an approved manufacturer of Watertight and Gastight doors and Watertight hatches in Steel and Aluminium for ships

Our products have undergone stringent cyclic and type testing before being accorded approvals.

Materials of Construction

- Marine Grade Mild Steel IS 2062 grade B compliant/other Marine grade steels.
- Aluminium Alloy 5086/5083 (various tempers) and 6082 or as specified by customer
- Components of Stainless Steel ASTM/ASME/AISI TP 316
- Brass IS 319/410

Process

- Die formed Single embossing or Fabrication

Type

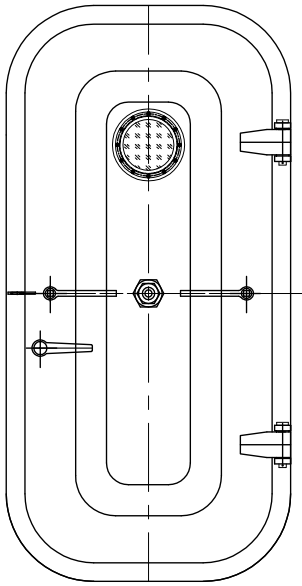
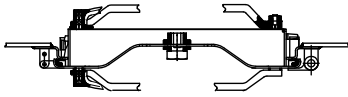
- Quick acting with lever bolting multiple clips
- Individual Dog/Clips



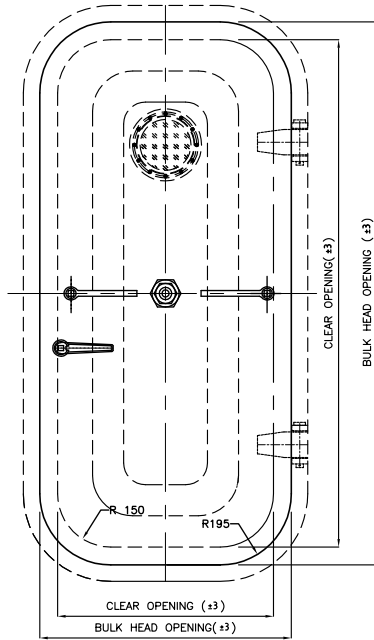
E-Stress, Displacement and Fatigue

From the fatigue calculation using SN curve, the maximum number of cycles it can withstand for the unit loading is $10^{5.4}$ cycles.

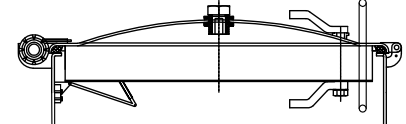
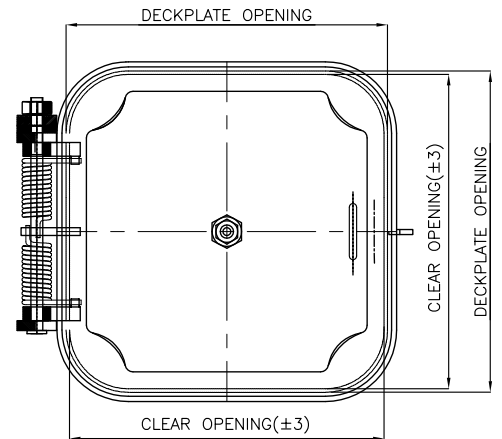
Guideline Drawings for Sample Door and Hatch



VIEW SHOWING
DOOR LH(LHO/LHI) OPENING



BULK HEAD CUT OUT DETAILS



WATER TIGHT HATCH ASSEMBLY

FF - Quality Standards





Standards complied with

- GOST 25088-98
- Def Stan 02-127 Access fittings and equipment
- IMO/SOLAS guidelines

Design Capabilities

- Mechanical design
- Finite element analysis
- Stress analysis and support design
- Structural design

Integrated Facilities for Manufacturing

- Forming
- Forging
- Bending
- Fabrication
- Assembly
- Inspections
- Packing
- Documentation
- Dispatch



Our machine shop has over 20 different CNC and NC high precision machines, as well as a wide variety of conventional machines

Integrated Facilities

3000 Ton Press



Furnaces



450 Ton Press



Testing Lab



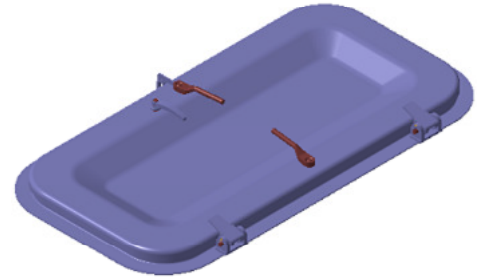
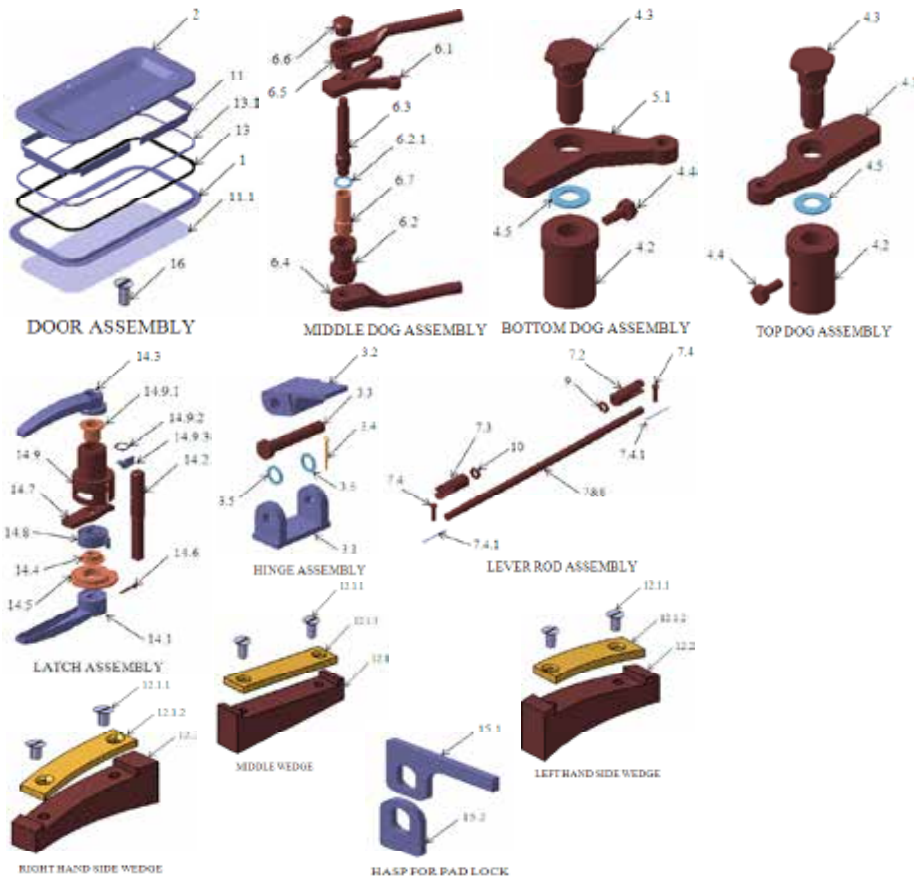
Design



CNC Machines



Exploded Views of watertight Hatch 1800x750x3 mm

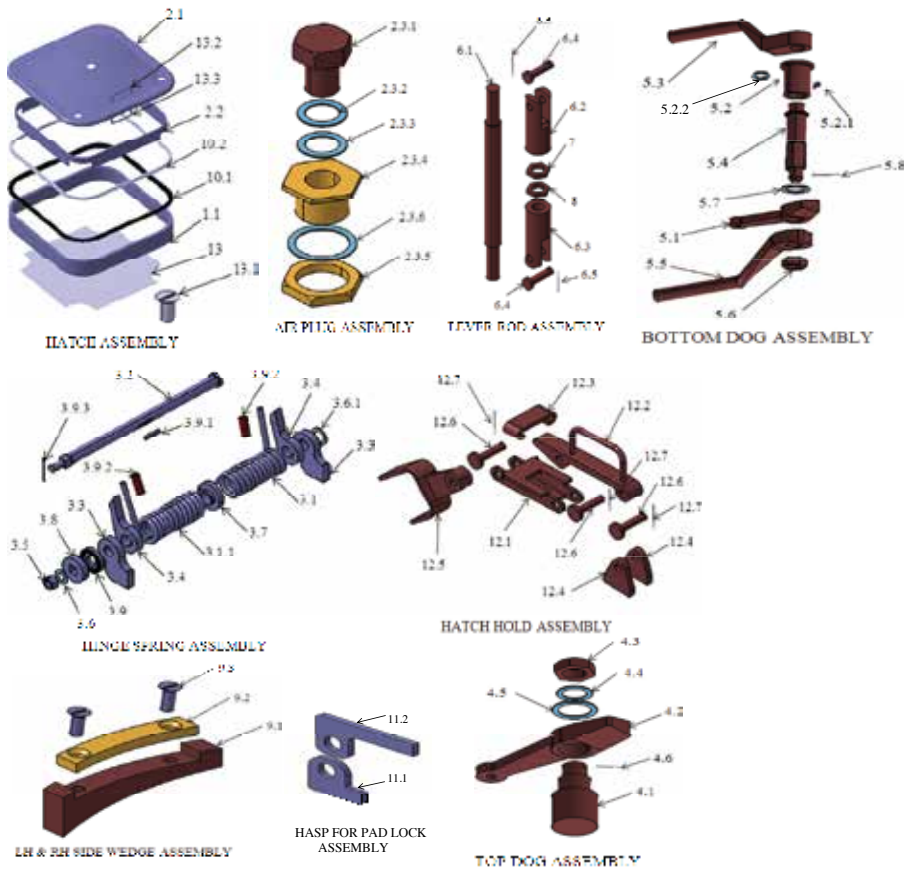


ASSEMBLY

PART. NO	PART DESCRIPTION	MATERIAL	QTY
1	DOOR FRAME	MS CONFIRMING TO IS 2062 Gr.B	1
2	DOOR SHUTTER	MS CONFIRMING TO IS 2062 Gr.B	1
3.1	HINGE FEMALE PART	MS CONFIRMING TO IS 2062 Gr.B	2
3.2	HINGE MALE PART	MS CONFIRMING TO IS 2062 Gr.B	2
3.3	PIN	AS PER ASTM/ASME/AISI TP 316/321	2
3.4	SPLIT PIN	BRASS/ SS316/ 321	2
3.5	WASHER	AS PER ASTM/ASME/AISI TP 316/321	4
4.1	TOP DOG	AS PER ASTM/ASME/AISI TP 316/321	2
4.2	TOP/BOTTOM DOG MOUNTING BUSH	AS PER ASTM/ASME/AISI TP 316/321	4
4.3	TOP/ BOTTOM DOG PIVOT	AS PER ASTM/ASME/AISI TP 316/321	4
4.4	BOLT-M8	AS PER ASTM/ASME/AISI TP 316/321	4
4.5	WASHER	AS PER ASTM/ASME/AISI TP 316/321	4
5.1	BOTTOM DOG	AS PER ASTM/ASME/AISI TP 316/321	2
6.1	MIDDLE DOG	AS PER ASTM/ASME/AISI TP 316/321	2
6.2	BUSH	AS PER ASTM/ASME/AISI TP 316/321	2
6.2.1	WASHER	AS PER ASTM/ASME/AISI TP 316/321	2
6.3	SPINDLE	AS PER ASTM/ASME/AISI TP 316/321	2
6.4	OUTSIDE HANDLE	AS PER ASTM/ASME/AISI TP 316/321	2
6.5	INSIDE HANDLE	AS PER ASTM/ASME/AISI TP 316/321	2
6.6	CAP NUT	AS PER ASTM/ASME/AISI TP 316/321	2
6.7	TEFLON BUSH	TEFLON	2
7	TOP LEVER	AS PER ASTM/ASME/AISI TP 316/321	2
7.2	Y-PIECE LH THREAD	AS PER ASTM/ASME/AISI TP 316/321	4
7.3	Y-PIECE RH THREAD	AS PER ASTM/ASME/AISI TP 316/321	4
7.4	PINS	AS PER ASTM/ASME/AISI TP 316/321	8
7.4.1	SPLIT PINS	AS PER ASTM/ASME/AISI TP 316/321	8
8	BOTTOM LEVER	AS PER ASTM/ASME/AISI TP 316/321	2
9	NUT M16 RH THREAD	AS PER ASTM/ASME/AISI TP 316/321	4
10	NUT M16 LH THREAD	AS PER ASTM/ASME/AISI TP 316/321	4
11	DOOR FLAT	MS CONFIRMING TO IS 2062 Gr.B	1
11.1	FLAT COVER	GI IRON	1
12.1	MIDDLE WEDGE	AS PER ASTM/ASME/AISI TP 316/321	2
12.1.1	M6 SCREW FOR ALL WEDGE	AS PER ASTM/ASME/AISI TP 316/321	12
12.1.2	BRASS PLATE	BRASS IS-410	4

PART. NO	PART DESCRIPTION	MATERIAL	QTY
12.1.3	BRASS PLATE MIDDLE WEDGE	BRASS IS-410	2
12.2	LEFT HAND SIDE WEDGE	AS PER ASTM/ASME/AISI TP 316/321	2
12.3	RIGHT HAND SIDE WEDGE	AS PER ASTM/ASME/AISI TP 316/321	2
13	SEALING GASKET	EPDM/NEOPRENE	1
13.1	RUBBER STOPPER	MS CONFIRMING TO IS 2062 Gr.B	1
14.1	LOCK OUTSIDE HANDLE	MS CONFIRMING TO IS 2062 Gr.B	1
14.2	SHAFT	AS PER ASTM/ASME/AISI TP 316/321	1
14.3	LOCK INSIDE HANDLE	MS CONFIRMING TO IS 2062 Gr.B	1
14.4	TEFLON CAP	TEFLON	1
14.5	TEFLON COVER	TEFLON	1
14.6	SHAFT LOCKING SCREW	AS PER ASTM/ASME/AISI TP 316/321	1
14.7	LOCK (THIMBLE)	AS PER ASTM/ASME/AISI TP 316/321	1
14.8	SPRING	SPRING STEEL	1
14.9	SLEEVE	AS PER ASTM/ASME/AISI TP 316/321	1
14.9.1	BUSH (TEFLON)	TEFLON	1
14.9.2	O-RING	NEOPRENE	1
14.9.3	LOCKING PAD	MS CONFIRMING TO IS 2062 Gr.B	1
15.1	HASP FOR PAD LOCK FEMALE	MS CONFIRMING TO IS 2062 Gr.B	1
15.2	HASP FOR PAD LOCK MALE	MS CONFIRMING TO IS 2062 Gr.B	1
16	M6 SCREWS	MS CONFIRMING TO IS 2062 Gr.B	22

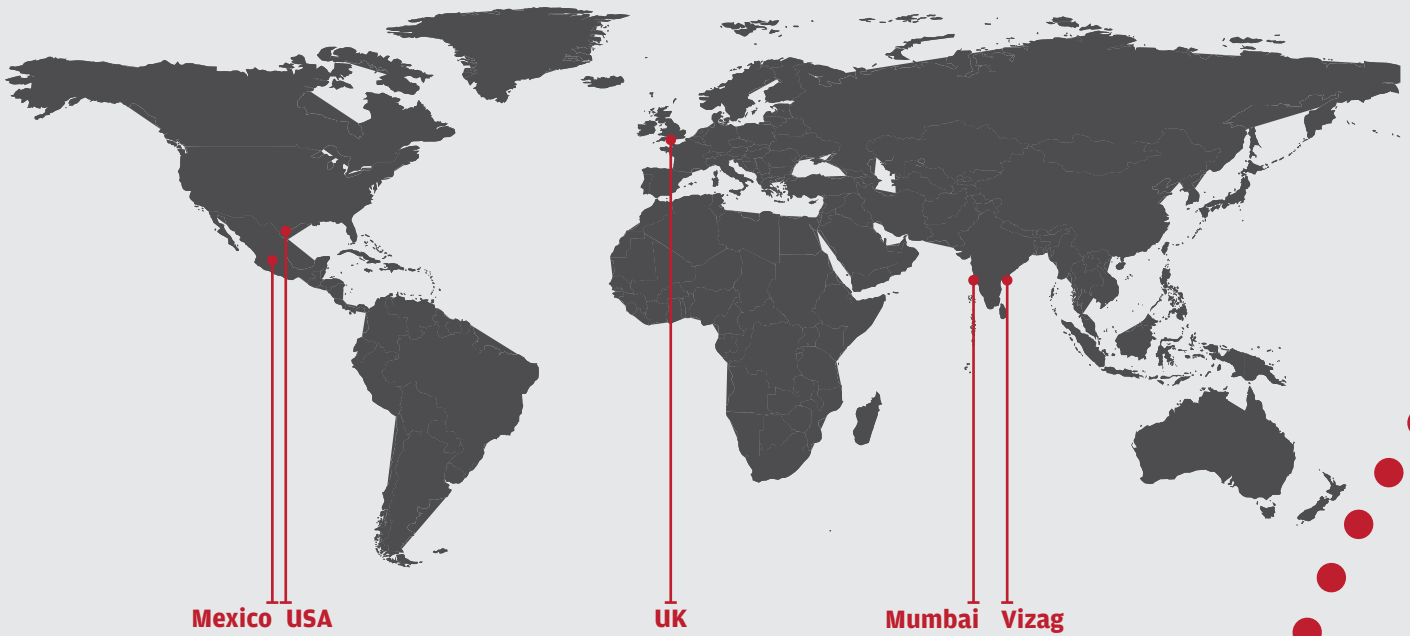
Exploded Views of watertight Hatch 800x800x6 mm



ASSEMBLY

PART. NO	PART DESCRIPTION	MATERIAL	QTY
1.1	COAMING	MS CONFIRMING TO IS 2062 Gr.B	1
2.1	HATCH COVER	MS CONFIRMING TO IS 2062 Gr.B	1
2.2	COVER STIFFNER	MS CONFIRMING TO IS 2062 Gr.B	1
2.3.1	Plug	AS PER ASTM/ASME/AISI TP 316 (OR) 321	1
2.3.2	WASHER	ASBESTOS FIBRE IS 2712	1
2.3.3	WASHER	MS GALVANISED	1
2.3.4	Deck Gland	BRASS IS 319 (OR) EQUIVALENT	1
2.3.5	NUT	BRASS IS 319 (OR) EQUIVALENT	1
2.3.6	WASHER	ASBESTOS FIBRE IS 2712	1
3.1	SPRING	EN45J/ 42J	1
3.1.1	SPRING	EN45J/ 42J	1
3.2	SPRING SHAFT	MS CONFIRMING TO IS 2062 Gr.B	1
3.3	HINGE	MS CONFIRMING TO IS 2062 Gr.B	2
3.4	PAD FOR ALIGNMENT	MS CONFIRMING TO IS 2062 Gr.B	2
3.5	NUT	MS CONFIRMING TO IS 2062 Gr.B	1
3.6	WASHER	MS CONFIRMING TO IS 2062 Gr.B	1
3.6.1	WASHER	MS CONFIRMING TO IS 2062 Gr.B	1
3.7	SPRING LOCKING BUSH	MS CONFIRMING TO IS 2062 Gr.B	1
3.8	GEAR BLOCK MALE	MS CONFIRMING TO IS 2062 Gr.B	1
3.9	GEAR BLOCK FE MALE	MS CONFIRMING TO IS 2062 Gr.B	1
3.9.1	KEY	MS CONFIRMING TO IS 2062 Gr.B	1
3.9.2	SPRING HOLDING PIPE	SA 106 GR.B	2
3.9.3	SPLIT PIN	AS PER ASTM/ASME/AISI TP 316 (OR) 321	1
4.1	TOP DOG SUPPORTED ROD	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
4.2	TOP DOG	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
4.3	M24 NUT	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
4.4	WASHER	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
4.5	WASHER	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
4.6	SPLIT PIN	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.1	.BOTTOM DOG	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.2	BUSH	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.2.1	GREASE NIPPLE	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.2.2	O-Rings	RUBBER	4
5.3	OUTSIDE HANDLE	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2

PART. NO	PART DESCRIPTION	MATERIAL	QTY
5.4	SPINDLE	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.5	INSIDE HANDLE	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.6	NUT	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.7	WASHER	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
5.8	SPLIT PIN	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
6.1	LEVER ROD	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
6.2	Y-PIECE LH	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
6.3	Y-PIECE RH	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
6.4	PINS	AS PER ASTM/ASME/AISI TP 316 (OR) 321	4
6.5	SPLIT PINS	AS PER ASTM/ASME/AISI TP 316 (OR) 321	4
7	M16 NUT LH	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
8	M16 NUT RH	AS PER ASTM/ASME/AISI TP 316 (OR) 321	2
9.1	WEDGE PLATE FOR LEFT & RIGHT	AS PER ASTM/ASME/AISI TP 316 (OR) 321	4
9.2	BRASS PLATE FOR LEFT & RIGHT	BRASS IS 410 (OR) EQUIVALENT	4
9.3	M6 SCREW	MS CONFIRMING TO IS 2062 GR.B	8
10.1	GASKET	EPDM/NEOPRENE	1
10.2	RUBBER STOPPER	MS CONFIRMING TO IS 2062 Gr.B	1
11.1	HASP FOR PAD LOCK MALE	MS CONFIRMING TO IS 2062 Gr.B	1
11.2	HASP FOR PAD LOCK FEMALE	MS CONFIRMING TO IS 2062 Gr.B	1
12.1	LOCKING MALE PART	MS CONFIRMING TO IS 2062 Gr.B	1
12.2	LOCKING FE MALE PART	MS CONFIRMING TO IS 2062 Gr.B	1
12.3	LOCKING C CLAMP	MS CONFIRMING TO IS 2062 Gr.B	1
12.4	COAMING SIDE BRACKET	MS CONFIRMING TO IS 2062 Gr.B	2
12.5	COVER SIDE BRACKET	MS CONFIRMING TO IS 2062 Gr.B	1
12.6	PINS	MS CONFIRMING TO IS 2062 Gr.B	3
12.7	SPLIT PINS	MS CONFIRMING TO IS 2062 Gr.B	3
13	HATCH FLAT COVER	GI IRON	1
13.1	M6 SCREWS	MS CONFIRMING TO IS 2062 Gr.B	16
13.2	OUTSIDE LIFTING HANDLE	MS CONFIRMING TO IS 2062 Gr.B	1
13.3	INSIDE LIFTING HANDLE	MS CONFIRMING TO IS 2062 Gr.B	1



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Flash Forge

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