

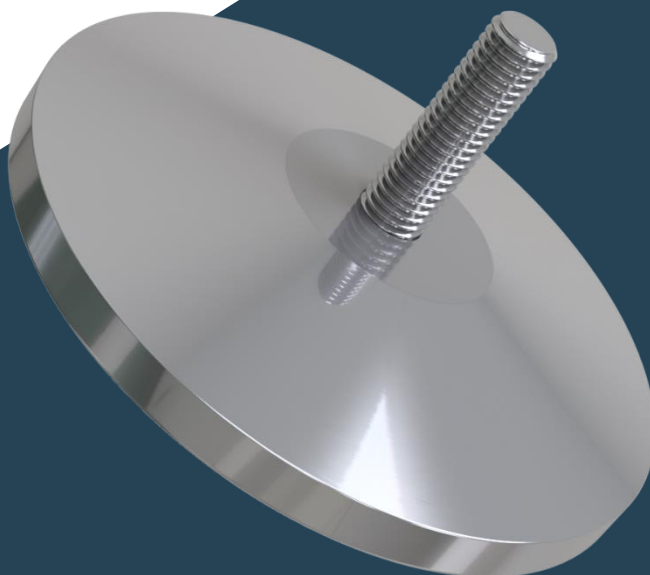


TECHNICAL DATA SHEET

C-CLAW™

Non-intrusive and heavy-duty fastener
for steel structures

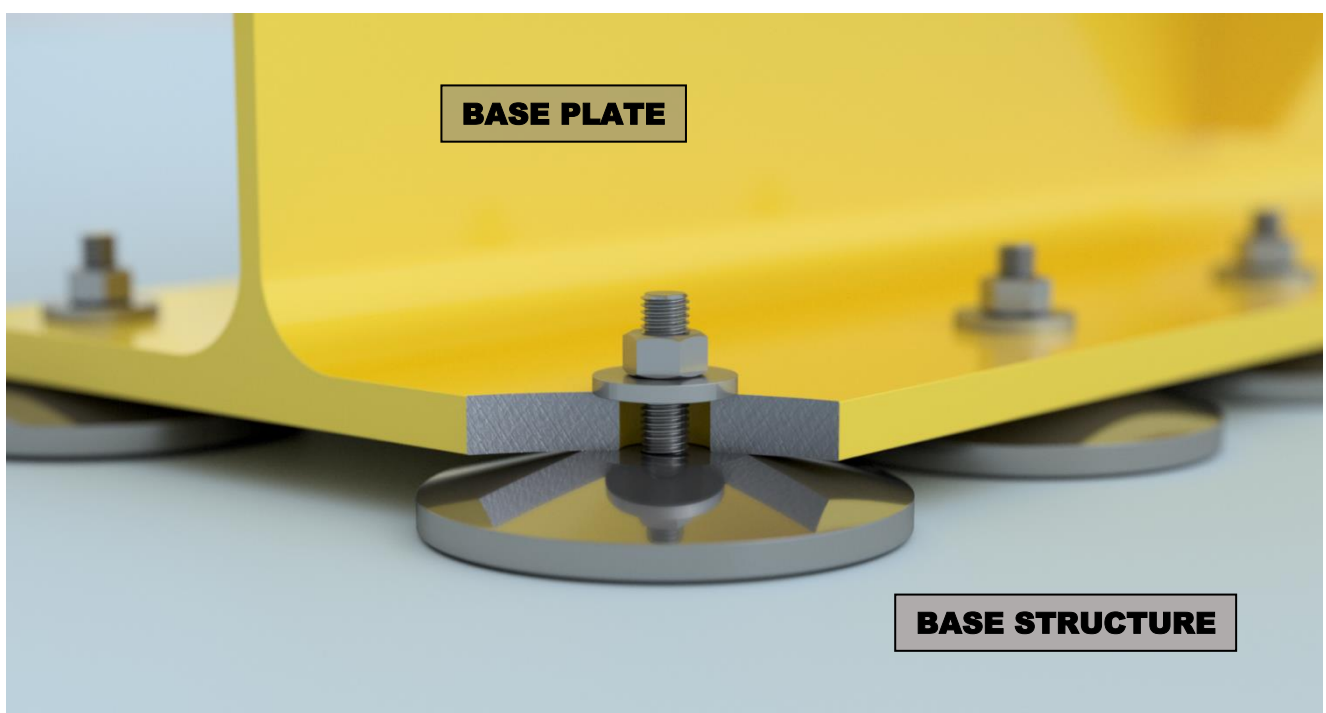
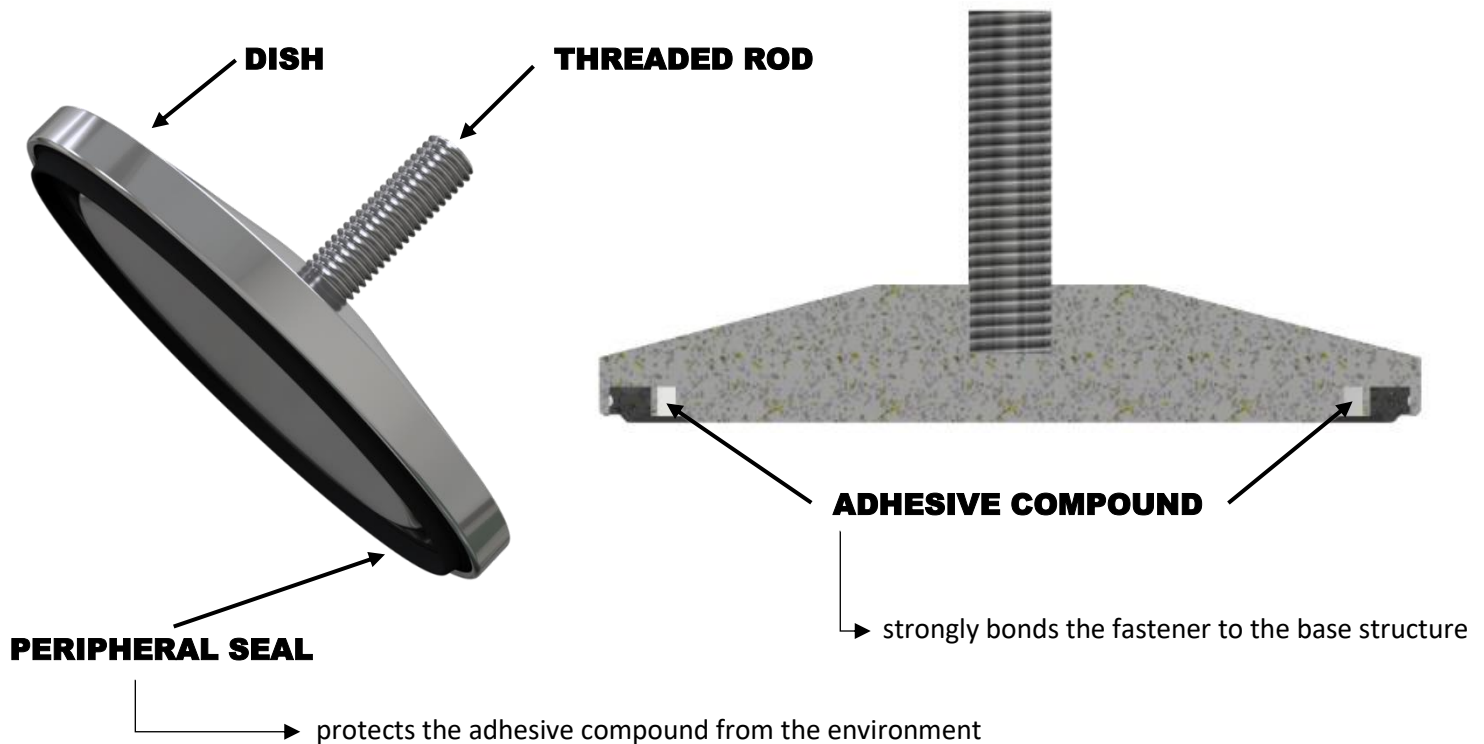
A true alternative to welding and drilling



C-CLAW BONDED FASTENER

COLD PAD has developed C-Claw, a heavy-duty fastener with a process controlled installation that is non-intrusive, durable, safe and reliable.

C-Claw is specially designed for offshore environments like FPSO, where hot works generate a considerable number of constraints, shutdowns, and risks. It truly is revolutionary in the marine world and was inspired by composite techniques that have been used for decades in aeronautics.



MAIN APPLICATIONS



SMALL PIPE SUPPORT

1

For further information regarding Marine Applications for C-Claw, visit COLD PAD's website:

<https://www.cold-pad.com/marine-applications>



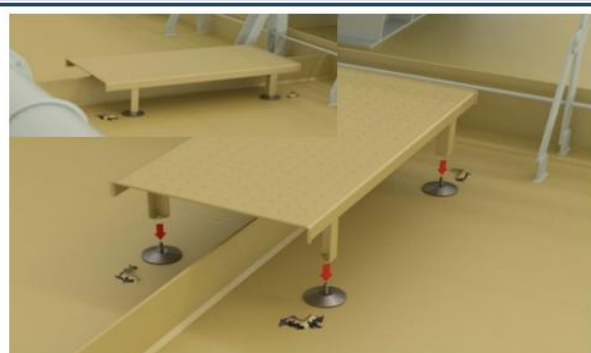
LARGE PIPE SUPPORT

2



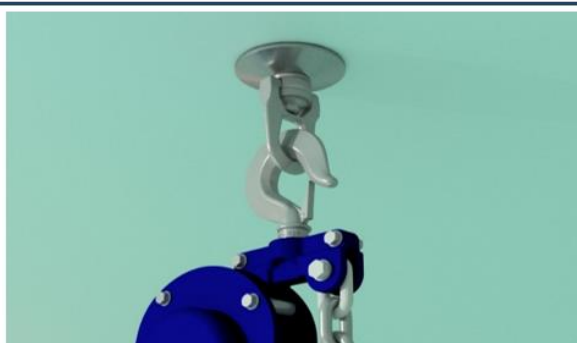
HANDRAIL

3



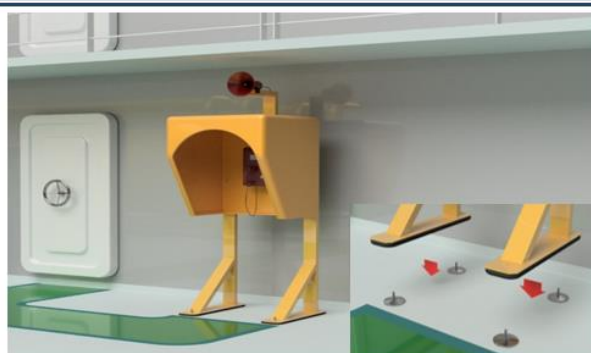
LADDER / STAIRS

4



LIFTING LUG

5

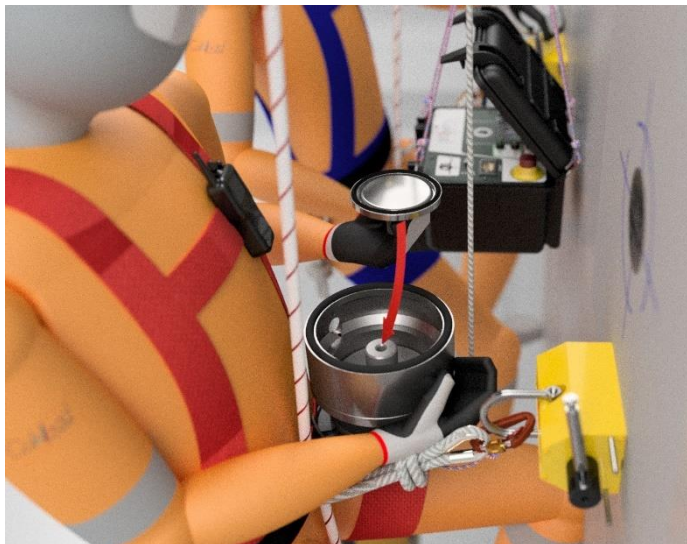


ELECTRICAL CABINET

6

INSTALLATION EQUIPMENT

C-HAWK: A PROCESS-CONTROLLED TOOL



Adhesive bonding operations require a good control of the whole bonding procedure (control of atmospheric conditions, surface preparation, adhesive preparation and application, polymerization...).

C-Hawk proprietary tool offers a perfect control of the bonding operations in harsh “industrial” conditions by creating optimum environmental conditions for repeatable performance.

C-Hawk is a low power tool and can be use in hazardous areas (with potentially explosive atmosphere)

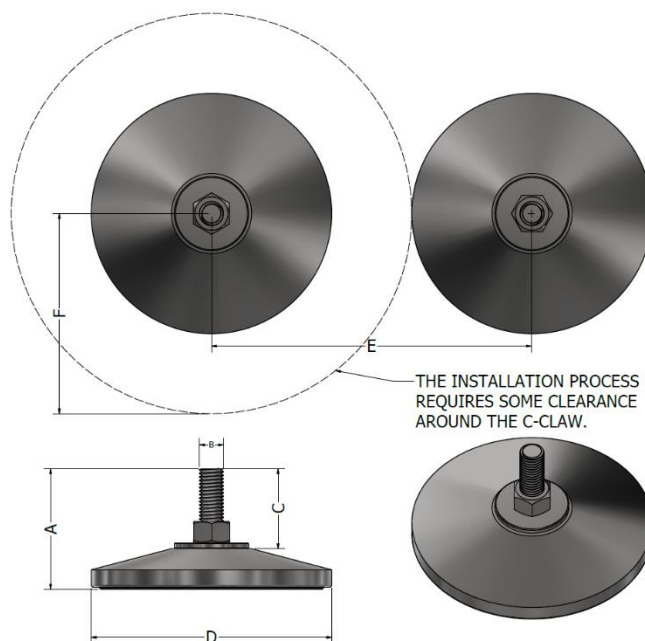
C-CLAW PARTS AND MATERIALS

Item	Material
Threaded rod	SS* A4-70
Nut	SS A4-70 min.
Washer	SS A4
Dish	SS316L (1.4404)
Internal peripheral seal	EPDM Rubber
Base structure	Structural steel
Base plate	Structural steel
External peripheral seal (optional)	Silicone
*SS: Stainless Steel	

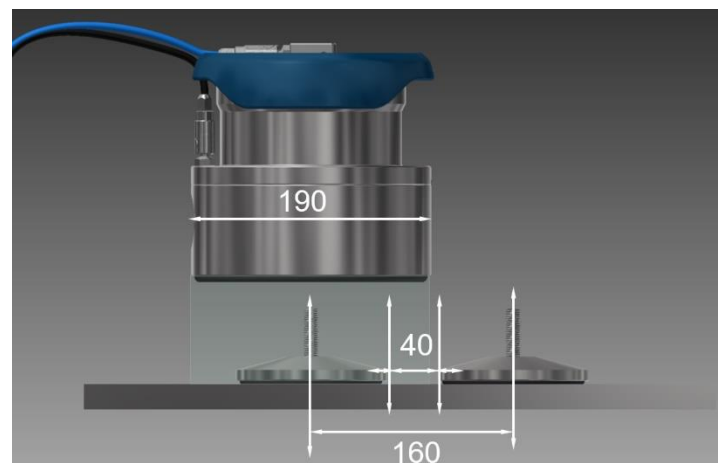
QUALIFIED ADHESIVES

STANDARD TEMPERATURE ADHESIVE (STA) < 70 °C	HIGH TEMPERATURE ADHESIVE (HTA) < 100 °C
Certified Methacrylate Adhesive	Certified Epoxy Adhesive

C-CLAW CHARACTERISTICS



Dimensions	Value
A (height of C-Claw)	60 mm
B (rod diameter)	M12X1.75
C (rod length)	40mm
D (C-Claw diameter)	120mm
E (minimal distance between 2 C-Claw)	160 mm
F (radial clearance)	40 mm
Minimum thickness of base metal (with STA)	10 mm
Minimum thickness of base metal (with HTA)	15 mm
Other specifications	Value
Weight	1150 g
Intended design life	15 years



MAXIMUM DESIGN LOAD

						SHORT TERM LOADS		LONG TERM LOADS	
Adhesive	Surface preparation device	Base structure installation temperature range	Load type	Safety class as per DNV-ST-C501	Min in service temperature (°C)	Max. in service temperature under temporary loading (°C)	Mechanical capacity (kN)	Max. in service temperature under permanent loading (°C)	Mechanical capacity (kN)
STA	Bristle Blaster	[+10°C; +40°C]	Tension	Low	-20	+70	30	+50	3
				Normal			20		2
			Shear	Low	-20	+70	20	+50	2
				Normal			10		1
HTA	Bristle Blaster	[+10°C; +100°C]	Tension	Low	-20	+100	5	+100	5
				Normal			1		1
			Shear	Low	-20	+100	17	+100	17
				Normal			30		16
	Grit-Blasting		Tension	Low	-20	+100	10	+100	10

LOW SAFETY CLASS: WHERE FAILURE OF THE STRUCTURE IMPLIES LOW RISK OF HUMAN INJURY AND MINOR ENVIRONMENTAL, ECONOMIC AND POLITICAL CONSEQUENCES.

NORMAL SAFETY CLASS: WHERE FAILURE OF THE STRUCTURE IMPLIES RISK OF HUMAN INJURY, SIGNIFICANT ENVIRONMENTAL POLLUTION OR SIGNIFICANT ECONOMIC OR POLITICAL CONSEQUENCES.

C-CLAW INSTALLATION STEPS

PRELIMINARY SURVEY PRIOR TO INSTALLATION

Several controls shall be done prior to C-Claw installation:

LOADS

- ✓ Loads intensity and loads duration are admissible for the intended application as per table in page 6.

TEMPERATURE

- ✓ The temperature of both the base metal and the C-Claw shall be within an acceptable range for the installation, as per table page 6.
- ✓ The expected temperature of the base metal shall be within an acceptable range for the intended application, as per table page 6.

BASE METAL

- ✓ The base metal is made of steel (any typical structural steel), with a minimum thickness of 10mm for STA and 15mm for HTA.
- ✓ The base metal should be flat or with a radius curvature above 10m (contact COLD PAD for curved base metal with a radius curvature under 10m).
- ✓ The base metal is in good shape (no corrosion canker) and smooth (no weal seam) with no more than a few localized corrosion pits no deeper than 0.5mm.

CLASH CHECK / INTERFERENCES

- ✓ The intended position of C-Claw's rod should be at least 100mm away from any interference (wall, base plate...) or from the edge of the plate, as per figure page 5.
- ✓ The minimum distance between two C-Claw rods is 160mm (measured center to center).

COATING

- ✓ Paint touch up around the C-Claw will be required unless all two conditions below are met at the same time:
 - The coating/painting is in good shape and smooth (no cracks, holes, scratch etc.)
 - The coating is at most 500µm thick

EARTHING

- ✓ C-Claw does not provide electrical continuity through the bondline. Additional earthing device may be required depending on the application.

INSTALLATION PROCESS



Recommended PPE - 005_MT_E_004 [2]



Coating removal & surface roughening with Bristle Blaster or Grit Blasting
005_PT_M_008 [2]

1



Cleaning with solvent impregnated wipes
005_PT_M_008 [2]

2



Dispensing adhesive
005_PT_M_009 [3]

3



C-Claw installation with C-Hawk
005_PT_M_009 [3]

4



Proof load testing
005_PT_M_011 [4]

5



Removal when necessary
005_PT_M_001 [5]

6

REMOVAL

If necessary, C-Claw can be removed with a specific tool, called C-Claw remover, developed by COLD PAD and provided with the installation tool C-Hawk. C-Claw cannot be reused after removal.

SURROUNDINGS

C-Claw fastener can be exposed to the marine environment (relative humidity up to 100%, sun, seawater without permanent immersion). Contact with hydrocarbon may occur if it remains occasional.

Accidental design events such as fire, blast and impact/dropped object are excluded at this stage.

TRAINING

C-Claw can only be installed by trained and Authorized Operators holding a valid certificate issued exclusively by Cold Pad. The validity of the training certificate is 24 months starting from the completion date of the training.

TRACEABILITY AND INSPECTION

Each C-Claw fastener is identified with a unique serial number onto package. For each C-Claw, COLD PAD is able to guarantee a full traceability of manufacturing QAQC documents such as materials certificates and dimensional control reports.

C-Claw can only be installed by authorized personnel using C-Hawk installation tool. The standard installation checklist and data recording by the C-Hawk tool ensure the traceability of installation operations.

After installation, each C-Claw fastener is proof load tested at up to 25 kN in tension according to the Control and Testing Procedure [1].

SAFETY, HEALTH AND ENVIRONMENT

Impact of in-service C-Claw fastener on safety, health and environment is low for low safety class application. Accidental cases such as fire are excluded although a quantitative risk assessment has been performed for the particular case of a handrail fastened with C-Claw and submitted to fire.

For critical application such as lifting lug, C-Claw shall be proof tested at its nominal capacity multiplied by a coefficient above 1 to ensure it will be safe. The coefficient will depend on the application and the regulatory requirements.

STORAGE AND TRANSPORTATION

C-Claw shall be transported and stored in its original packaging in a clean (oil-free) and dry place to preserve the cleanliness and integrity of the packaging and used within 2 years from manufacture date. Cardboard boxes should not be stacked on more than 3 levels.

REFERENCES

- [1] «005_PT_E_011 - C-Claw control and testing procedure,» Last revision.
- [2] «005_MT_E_004 - C-Claw Quick Installation Manual,» Last revision.
- [3] «005_PT_E_009 - C-Claw Installation Procedure,» Last revision.
- [4] «005_PT_E_008 - Surface preparation procedure,» Last revision.
- [5] «005_PT_E_011 - Control procedure,» Last revision.
- [6] «005_PT_E_001 - Removal procedure,» Last revision.