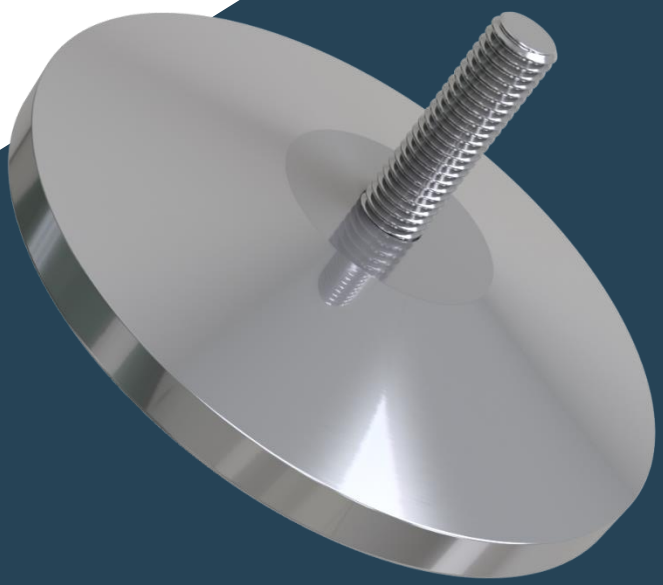
Coldpad SEAL BONDED

# TECHNICAL DATA SHEET

# C-CLAW™

## Non-intrusive and heavy-duty fastener for steel structures

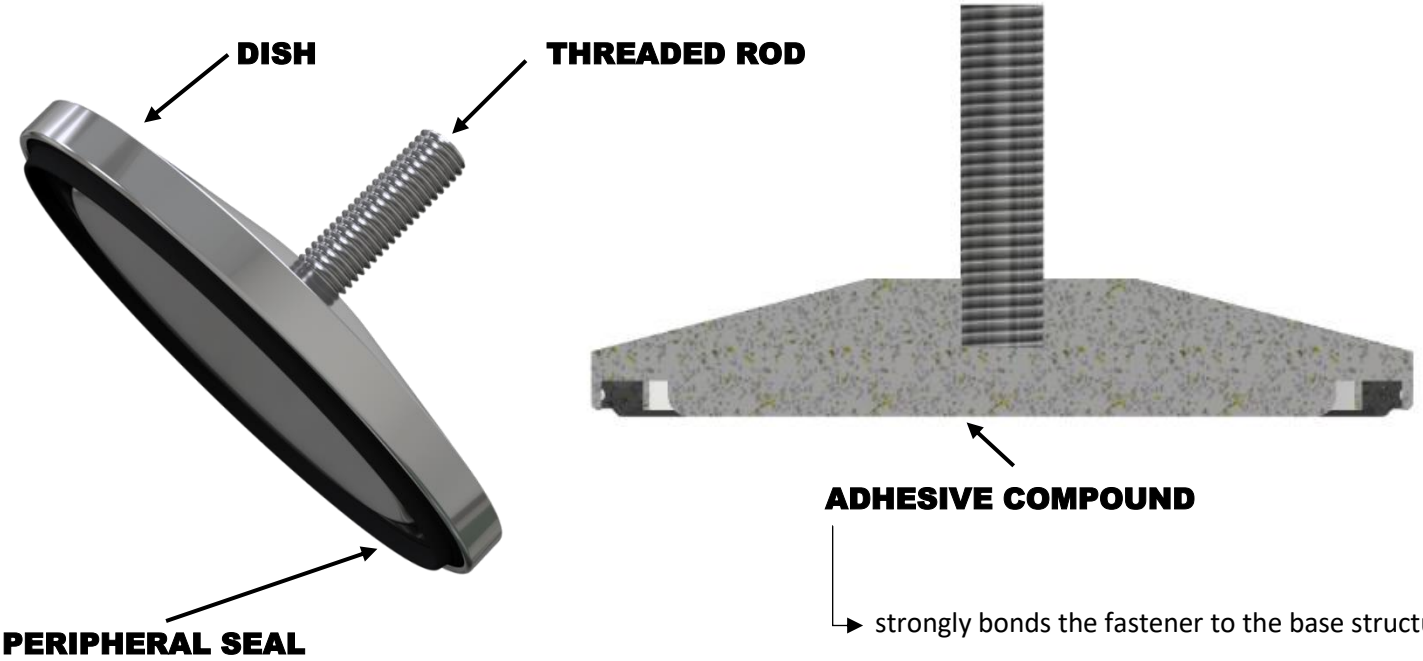
### A true alternative to welding and drilling

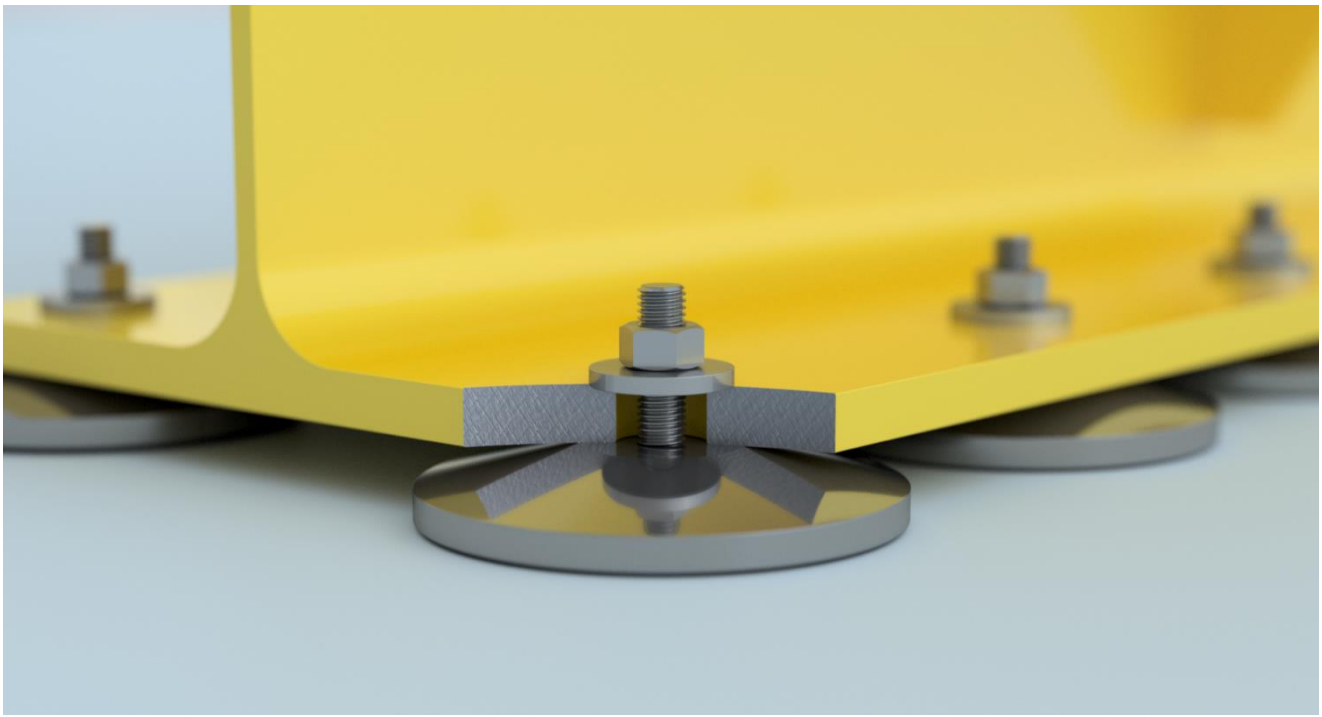


## C-CLAW BONDED FASTENER

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

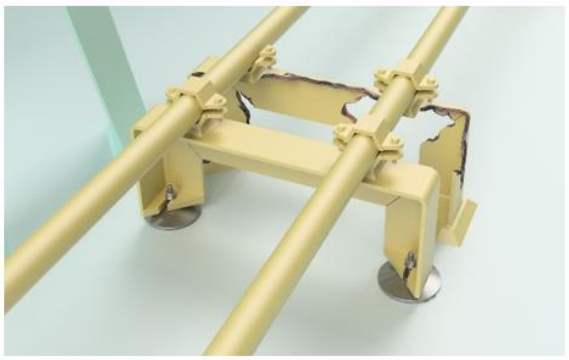
C-Claw is specially designed for marine and offshore environments like FPSO, where hot works generate a considerable number of constraints, shutdowns, and risks. It truly is revolutionary in the marine world and was inspired by composite techniques that have been used for decades in aeronautics.



## MAIN APPLICATIONS

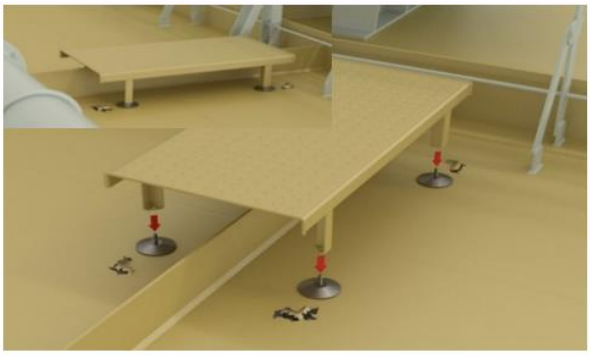
For further information regarding Marine Applications for C-Claw, visit COLD PAD's Youtube channel



SMALL PIPE SUPPORT 1

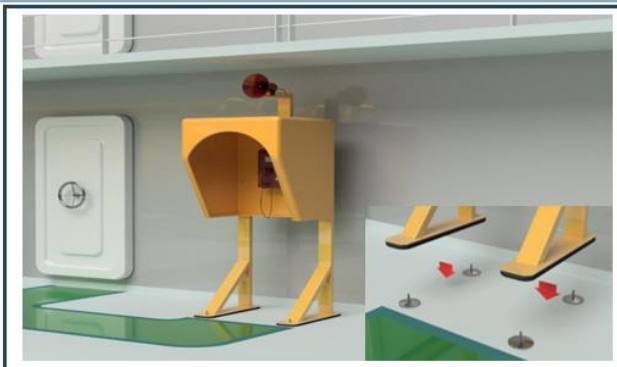
LARGE PIPE SUPPORT 2

HANDRAIL 3



LADDER / STAIRS 4

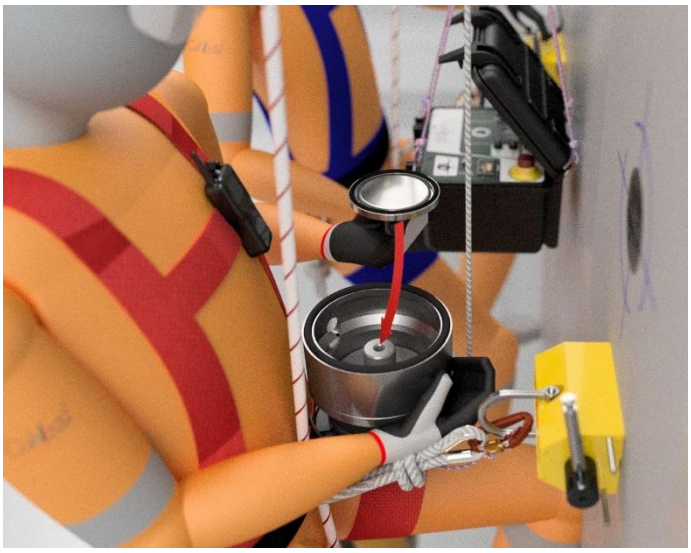
LIFTING LUG 5



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” environment by creating optimum atmospheric conditions locally, for repeatable performance, even for marine applications.

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

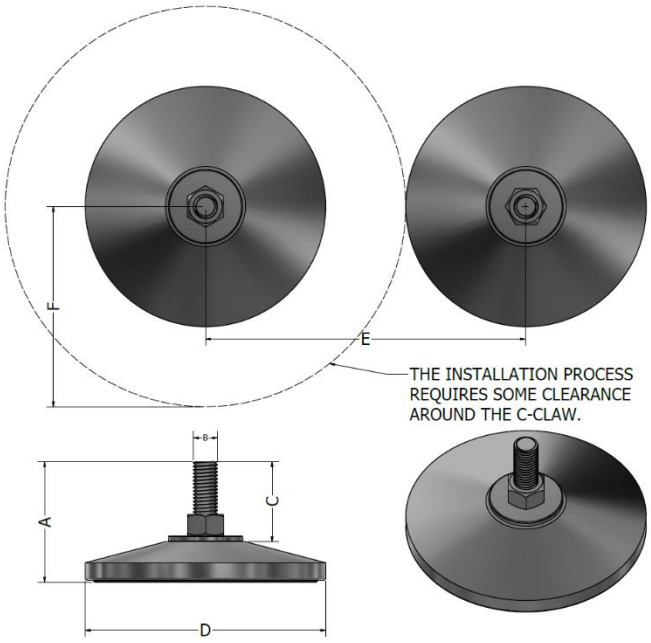
# C-CLAW PARTS AND MATERIALS

| 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 |
| **Capsule (optional)** | SS316L (1.4404) |
| ***SS: Stainless Steel** | |

# QUALIFIED ADHESIVES

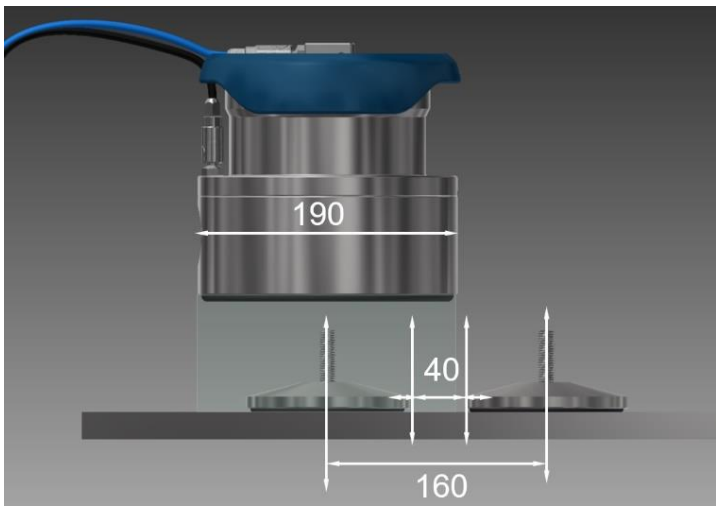
| STANDARD TEMPERATURE ADHESIVE (STA) < 70 °C | HIGH TEMPERATURE ADHESIVE (HTA) < 100 °C |
|---|---|
| **Certified Methacrylate Adhesive** | **Certified Epoxy Adhesive** |

# C-CLAW CHARACTERISTICS



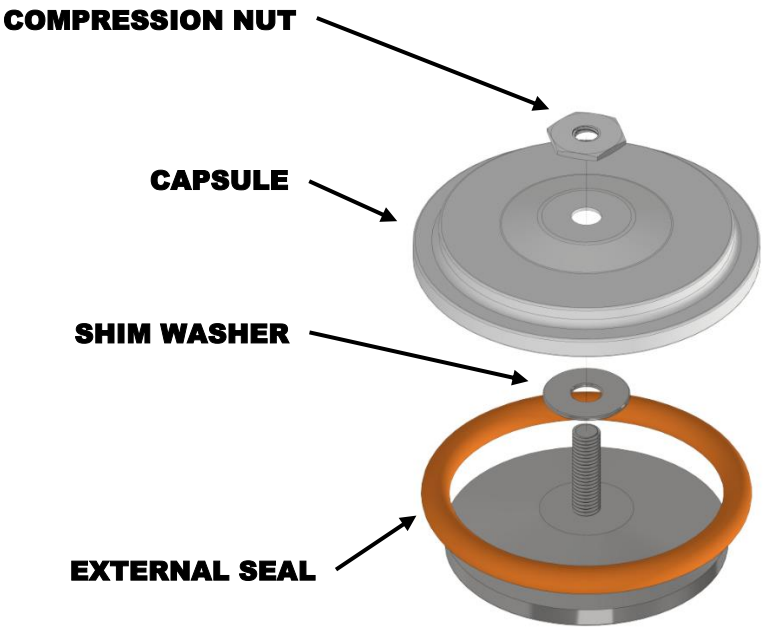

| Dimensions | Value |
|---|---|
| A (height of C-Claw) | **60 mm** |
| B (rod diameter) | **M12X1.75** |
| C (rod length) | **40mm *** |
| D (C-Claw diameter) | **120mm** |
| E (minimal distance between 2 C-Claw) | **160 mm** |
| F (radial clearance) | **100 mm** |
| Minimum thickness of base metal (with STA) | **10 mm** |
| Minimum thickness of base metal (with HTA) | **15 mm** |
| **standard length, can be removable or customized upon request* | |

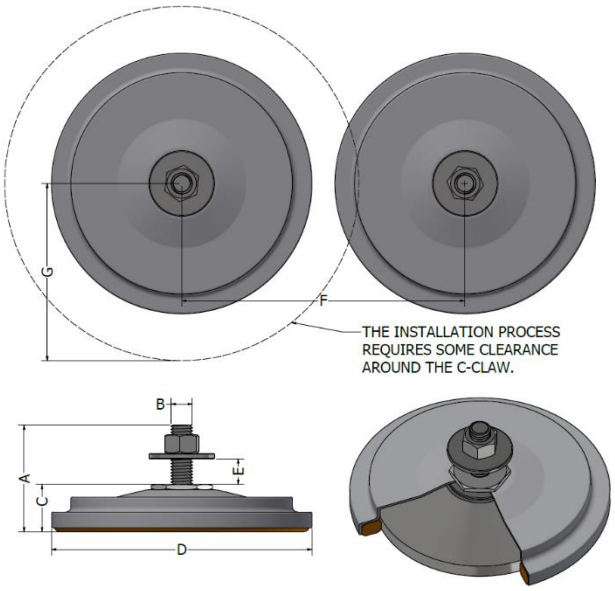
| Other specifications | Value |
|---|---|
| Weight | **1150 g** |
| Intended design life | **15 years** |



# OPTION: ENCAPSULATED C-CLAW

When the environment is permanently wet, C-Claw sealing can be reinforced with an extra external sealing protection composed of an external seal and a stainless-steel cap. This external sealing system is installed after complete curing of C-Claw adhesive.




| Dimensions | Value |
|---|---|
| A (height of C-Claw with capsule) | **60 mm** |
| B (rod diameter) | **M12X1.75** |
| C (height of capsule with compression nut) | **27mm*** |
| D (Capsule diameter) | **147mm** |
| E (Max thickness of equipment's base plate) | **15mm** |
| F (minimal distance between 2 C-Claw) | **160 mm** |
| G (radial clearance) | **100 mm** |

**standard length, can be removable or customized upon request*

| Other specifications | Value |
|---|---|
| **Weight of Encapsulated C-Claw** | **1450g** |

# MAXIMUM DESIGN LOAD

| INSTALLATION PARAMETERS | | | | | | 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. SERVICE temperature under short term loading (°C) | Mechanical capacity (kN) | Max. SERVICE temperature under long term 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 | **30** | +100 | **17** |
| | | | | Normal | | | | | **16** |
| | Grit-Blasting | | Tension | Low | -20 | +100 | **10** | +100 | **10** |

LONG-TERM LOADS STAND FOR SUSTAINED LOADS ACTING CONTINUOUSLY FOR A DURATION LONGER THAN ONE HOUR AND USUALLY YEARS, TYPICALLY GRAVITY.

SHORT TERM LOADS ARE THE OTHER LOADS AND REPRESENT MOST OF THEM, TYPICALLY GENERATED FROM ENVIRONMENTAL LOADINGS, DYNAMIC, INERTIA, CYCLIC LOADS ETC.**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

## 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 (contact COLD PAD for thinner base metal).
- ✓ The base metal should be flat or with a radius curvature above 10m (curved base metal is possible: contact COLD PAD for curved base metal with a radius curvature under 10m).
- ✓ The base metal surface state shall be in good conditions (no corrosion canker), free from obstacles such as weld beads, 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 axis to axis).

### 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 conditions and smooth (no cracks, holes, scratch etc.)
  - The coating thickness is at 500µm maximum

### EARTHING

- ✓ Depending on the conditions, C-Claw may not ensure earthing. Additional earthing device may be required depending on the application.

# INSTALLATION PROCESS

Recommended PPE - 005_MT_M_004 [1]

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

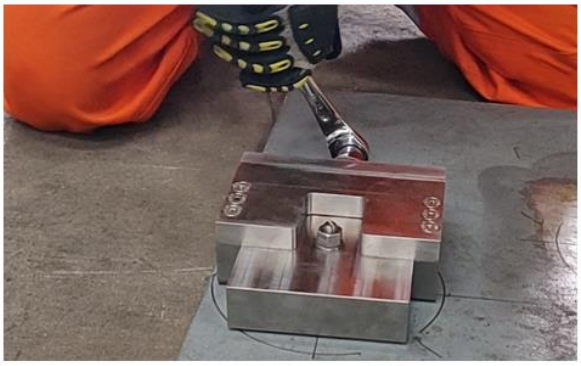
005_PT_M_009 [3]

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 as an option 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 tested at up to 25 kN in tension according to the Control and Testing Procedure [4].

# 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_MT_M_004 - C-Claw Quick Installation Manual,» Last revision.

[2] «005_PT_M_008 - Surface preparation procedure,» Last revision.

[3] «005_PT_M_009 - C-Claw Installation Procedure,» Last revision.

[4] «005_PT_M_011 - C-Claw control and testing procedure,» Last revision.

[5] «005_PT_M_001 - Removal procedure,» Last revision.