JUPA

SOLIDCITRIC
SMART SUBSEA CLEANING

PRODUCT CATALOGUE

www.jupa.no

PRODUCT CATALOGUE

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Achilles JQS
empowered by Achilles
Qualified

TRACK RECORD

Our customers:

Island Offshore	Allinvent	A60N (Australia)
TechnipFMC	Deepocean	Suncor Energy
Equinor	Norske Shell	TIOS AS
Subsea7	Baker Hughes, a GE company	Reach Subsea
Envirex	Oceaneering	Taqa Bratani
Aker BP	BP	IKM Technology
Helix Well Ops		

Vessels that have used SolidCitric:

MOU Island Frontier	Normand Ocean	Havila Subsea
MOU Island Wellserver	Seven Viking	Siem Pride
MOU Island Constructor	Edda Fonn	Edda Freya
Normand Mermaid	Edda Fauna	PMS Burullus
North Sea Giant	Well Enhancer	

Rigs that have used SolidCitric:

Bideford Dolphin	Transocean Enabler	Deepsea Stavanger
Transocean Encourage	Transocean Endurance	Terra Nova PFSO
Visund	Askeladden	Deepsea Nordkapp

List of operators and fields that have successfully used SolidCitric:

Operator	*Field*	*Water depth*	*Country*
Equinor	Troll, Sleipner, Gullfaks, Åsgard, Snorre, Norne	80-550m	Norway
Norske Shell	Draugen, Knarr, Ormen Lange	250-900m	Norway
ExxonMobil	Sigyn	70m	Norway
ExxonMobil	Block B	300m	EG
AkerBP	Skarv, Jette	130 - 400m	Norway
Wintershall	Vega	370m	Norway
BP	Taurus-Libra	95 - 565m	Egypt
BP	Machar	80m	UK
Premier Oil	Huntington Field	90m	UK
Suncor	Terra Nova	100m	Canada

As of May 2019, Jupa has delivered more than 1120 SolidCitric cartridge.

P016

P016

P016

12 kg SolidCitric cartridge is shown

P016

P016 (Handling adapter)

Only 6 kg SolidCitric cartridge is used with P061

6 kg SolidCitric cartridge is shown

P016

P016

P016

Protective End Cap (Removed by ROV)

P047

P040

P016

P057

P043

P061

P035

P069

P065

P014

P031

P009

Manifold hub OneSubsea

KC4-10 Hub TechnipFMC

API 17H Cl. 1 - 4 Generic

API 17H Cl. 6 Generic

Vertical API 17H Cl. 1 - 4 valve or 3/8" manip valve

Vertical or horizontal API 17H Type A paddle valve

Tree Cap hub/stinger OneSubsea

Choke Bridge Hub TechnipFMC

4" Tree Cap Hub TechnipFMC

12" Wing Hub TechnipFMC

13 5/8" Re-entry Hub TechnipFMC

18 ¾" w/ITC Aker Solutions

18 ¾" w/ITC TechnipFMC

18 ¾" w/THISL TechnipFMC

4

P016

P016

P016

P037

P037

P037

P027

P037

P058

2,5 kg SolidCitric cartridge
(PN 100000230)

P013

P044

P059

P038

P023

P037

P069

P037

P017

P008

P039

HCLD sensor
Generic

2" vertical receptacle
Moffat

4" vertical receptacle
Moffat

SCM Guide Post funnel
Aker Solutions

MQC 13 Mk2
TechnipFMC

MQC 13 Mk 1
TechnipFMC

Norne MQC
TechnipFMC

4 or 7 pin Tronic
male receptacle
Siemens

4 or 7 pin Tronic
female receptacle
Siemens

3/4" vertical receptacle
Asker

Single Line Connector (SLC)
TechnipFMC

FREQUENTLY ASKED QUESTIONS

1) How much time can I save by using SolidCitric?

It depends - poor answer, we know. The severity of the lime scaling affects the time one will save, but in reality, the most important factor is whether you have other things you would rather be doing with the ROV instead of acid cleaning.

The best answer we can give you is that you must look at your past operations and determine how much time you typically spend on acid cleaning. Assuming that you have other things to do with your operational time then **please consider nearly all the time you have spent on acid cleaning today as time you would have saved by using our product.**

We have heard that our clients have saved 12 hours in some instances, other times 6 hours. It really varies on a case-to-case basis, as stated earlier above. However, imagine 12 hours saved with a stuck valve on for instance a rig at a million dollar day rate; your stockholders should love that!

2) How long should I allow the acid to work?

We like to say, "Let it work as long as possible". At a very minimum, it should be allowed to work for 2-4 hours.

Very important point follows: It would be very sad themoment a vessel, rig or ROV has a hold-up in operations because they are waiting for our product to work. This defies the entire winning purpose with our product. We believe that with good operational planning the acid can work for a long time if it is put to work as early as possible after arriving in field.

An example:
A client installed our product at Field A before continuing to Field B. When they later returned to do work at Field A everything they needed cleaned was finished.

3) How fast does the SolidCitric acid dissolve?

This mainly depends on three factors.

1) **The enclosed volume of water that can be saturated with acid.** If this volume is small and there is little loss to the environment, then the acid will stop dissolving once the enclosed volume has reached full saturation.

2) **The ambient water temperature.** Like sugar, it dissolves faster in warm water than in cold water.

3) **The water depth.** Greater depth means greater hydrostatic pressure. A polycarbonate tube that is open in one end encloses our acid. Due to this, it dissolves at an initially steady rate. However, external water pressure will create "channels" into the solid crystalline grains and hence increase the area exposed to water. Greater water depth will accelerate the dissolving rate. An operational example: In the North Sea, at typically 200m water depth, our 6 kg acid cartridge will dissolve in approximately 2-3 hours if allowed to dissolve into an unlimited volume. Our 12 kg acid cartridge will dissolve in approximately 4-6 hours under the same conditions.

Important note:
Tests in our workshop revealed that the pH value in the entrapped water around the asset interface drops rapidly just a few minutes after the acid starts dissolving. In other words, the water does not need to be fully saturated before the treatment becomes effective.

4) What about HSE? Is it safe and environmentally friendly?

Yes. SolidCitric is manufactured from 100% citric acid that is even approved for human consumption, although not recommended in larger quantities. It has been used for subsea acid cleaning for several decades. It is listed as a "green" PLONOR chemical with the relevant authorities. We have a SolidCitric MSDS available for your perusal.

5) What is the depth rating for SolidCitric?

To date, we do not know if there are any limitations. We know that our clients often use it at an approximately 600 meters water depth without any problems. The important thing is that one does not remove the protection cap before the installation of the cartridge is imminent. Waving the cartridge around in the ROV manipulator without the protection cap will lead to a "wash out" of some of the SolidCitric acid; this is an unnecessary loss that should be avoided.

HOW IT WORKS

Acid cleaning of different subsea interfaces has up until now been performed by mixing acid on deck and transporting the acid to the worksite by means of hose reel from deck or a compensator fitted on the ROV. This is a very inefficient way of doing things for expensive vessels/rigs. Furthermore, the loss of acid to the environment is known to be great, making the acid cleaning less effective.

The patented Jupa SolidCitric™ is a completely new way of attacking the acid cleaning task. The SolidCitric cartridge, containing citric acid in solid form, is simply brought to the worksite with the ROV. Here an adapter tool, for the interface to be cleaned, is installed and the SolidCitric cartridge is then fitted to the adapter tool.

The ROV, vessel or rig is now free to perform other tasks while the SolidCitric is being dissolved by the seawater creating a localised and efficient acid cleaning. When the acid dissolves it will flow downwards and displace/saturate the raw seawater which is entrapped in the adapter tool. The acid should be allowed to work as long as possible, and for a few hours as a minimum. For this reason the cartridge should therefore be installed as early as possible in the campaign when entering the field with ROV. After the cartridge has been removed it should be sufficient to merely water jet the subsea asset in order to achieve the expected clean end result.

Put simply, it is an "install and forget" way of doing things.

A number of adapters for common interfaces are presented on the following pages. For other applications Jupa can assist with designing and fabricating adapter tools, or the Client may choose to make these tools themselves to fit with the SolidCitric cartridges which Jupa will deliver. Please contact us if you have any questions related to SolidCitric.

SOLIDCITRIC CARTRIDGE

SOLIDCITRIC CARTRIDGE 12KG	
Description	**Unit**
Part number	100000149
Height	460mm
Diameter	150mm
Dry weight	12kg

SOLIDCITRIC CARTRIDGE 6KG	
Description	**Unit**
Part number	100000148
Height	230mm
Diameter	150mm
Dry weight	6kg

Jupa currently have 3 different standard sizes of SolidCitric cartridges:
- 12 kg   (PN 100000149)
- 6 kg   (PN 100000148)
- 1,3 kg   (PN 100000180)

The 12kg and the 6kg cartridges comprise a Ø150mm Polycarbonate tube which contains the SolidCitric acid (patents pending). These cartridges must be used in conjunction with the Handling Adapter (PN P016) and a polymer end cap (PN 100000038).

The 1,3kg cartridge comprise Ø90mm Polycarbonate tube which contains SolidCitric acid and must be used in conjunction with the Mini Handling Adapter (PN P037).

Other cartridge dimensions can be delivered on request.

Availability:
Standard cartridges of all sizes are normally immediately available for purchase.

SOLIDCITRIC CARTRIDGE 1,3KG	
Description	**Unit**
Part number	100000180
Height	150mm
Diameter	90mm
Dry weight	1,3kg

MINI HANDLING ADAPTER
ROV INTERFACE FOR SOLIDCITRIC

This tool (PN P037) is used to handle the 1,3kg SolidCitric cartridges (PN 100000180) with the ROV. The SolidCitric cartridge is inserted into the handling adapter and a dedicated nose adapter for the interface to be cleaned is then mounted to the mini handling adapter.

Availability:
This product is normally immediately available for both purchase and rental.

NOSE ADAPTERS

TRONIC 4-7 PIN RECEPTACLE
SIEMENS

Description	Unit
Part number	P023
Length	153mm
Diameter	116mm

4" RECEPTACLE
MOFFAT

Description	Unit
Part number	P059
Length	350mm
Diameter	120mm

TRONIC 4-7 PIN PLUG
SIEMENS

Description	Unit
Part number	P069
Length	167mm
Diameter	116mm

2" RECEPTACLE
TECHNIPFMC

Description	Unit
Part number	P044
Length	306mm
Diameter	116mm

SLC RECEPTACLE
TECHNIPFMC

Description	Unit
Part number	P013
Length	142mm
Diameter	116mm

HCLD
FOR MINI HANDLING ADAPTER

Description	Unit
Part number	P058
Length	48mm
Diameter	98mm

HANDLING ADAPTER
ROV INTERFACE FOR SOLIDCITRIC

This tool is used to handle the SolidCitric cartridges with the ROV. The tool comprises a D-handle and a flexjoint which is mounted on a closed end pipe section. The SolidCitric cartridge is inserted into the handling adapter and is fastened by tightening a number of set screws.

Availability:
This product is normally immediately available for both purchase and rental.

TECHNICAL DATA	
Description	**Unit**
Part number	P016
Height	321mm
Diameter	168mm
Dry weight	5kg
Submerged weight	4kg

PADDLE VALVE ADAPTER
BHGE (EX VETCO)

This adapter is designed for acid treating paddle valve receptacles (Ø78mm). The tool is designed for use together with 6kg SolidCitric cartridge (PN 100000148) and Handling adapter (P016).

Availability:
This product is normally immediately available for both purchase and rental.

TECHNICAL DATA	
Description	**Unit**
Part number	P070
Height	195mm
Diameter	195mm
Length	216mm
Dry weight	8kg
Submerged weight	5kg

CL. 1-4 VALVE RUBBER ADAPTER
GENERIC

This adapter enables cleaning of **horizontal or vertical** API 17H CL 1-4 valve buckets using a standard 6kg or 12kg SolidCitric cartridge. The valve rubber adapter is fitted around the SolidCitric cartridge on deck in order to provide a fit into API 17H CL 1-4 valve buckets.

Availability:
This tool is normally immediately available for purchase.

TECHNICAL DATA	
Description	**Unit**
Part number	P043
Lenght	235mm
Diameter	155mm
Dry weight	0,7kg

CL. 1-4 AND 3/8" ADAPTER
GENERIC

This adapter enables cleaning of vertical API 17H CL 4 valve buckets or vertical 3/8" manip valve buckets using a standard 6kg or 12kg SolidCitric cartridge.

Availability:
This tool is available for both purchase and rental. For purchase the estimated lead time from order is 3 weeks. Rental adapter is normally immediately available.

TECHNICAL DATA	
Description	**Unit**
Part number	P035
Height	350mm
Diameter	243mm
Dry weight	10kg
Submerged weight	8kg

This adapter enables cleaning of horizontal API 17H CL 1-4 valve buckets using a standard 6kg or 12kg SolidCitric cartridge.

Availability:
This product is normally immediately available for both purchase and rental.

This adapter enables cleaning of horizontal API 17H CL 6 valve buckets using a standard 6kg SolidCitric cartridge.

Availability:
This product is available for both purchase and rental. The estimated lead time from order is 3 weeks.
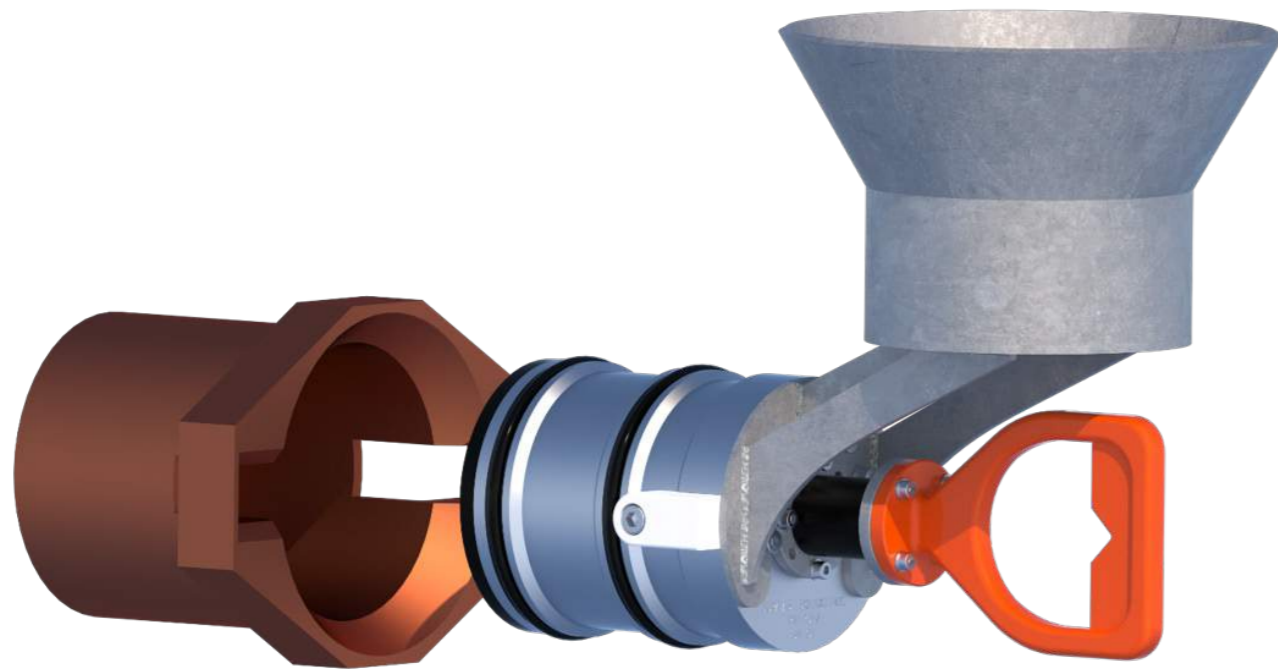
TECHNICAL DATA	
Description	Unit
Part number	P057
Length	476mm
Height	355mm
Width	278mm
Dry weight	15kg
Submerged weight	11kg
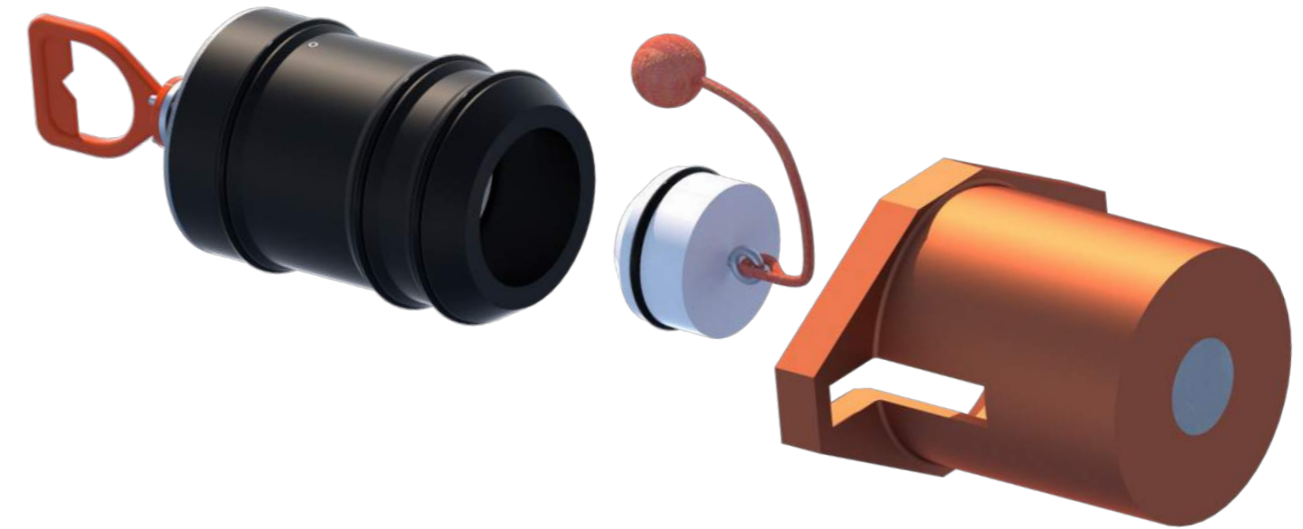
TECHNICAL DATA	
Description	Unit
Part number	P061
Diameter	239mm
Lenght	593mm
Dry weight	20kg
Submerged weight	7kg

MQC13 Mk1

Availability:
This product is available for both purchase and rental. For purchase the estimated lead time from order is 6 weeks. Rental adapter is normally immediately available.
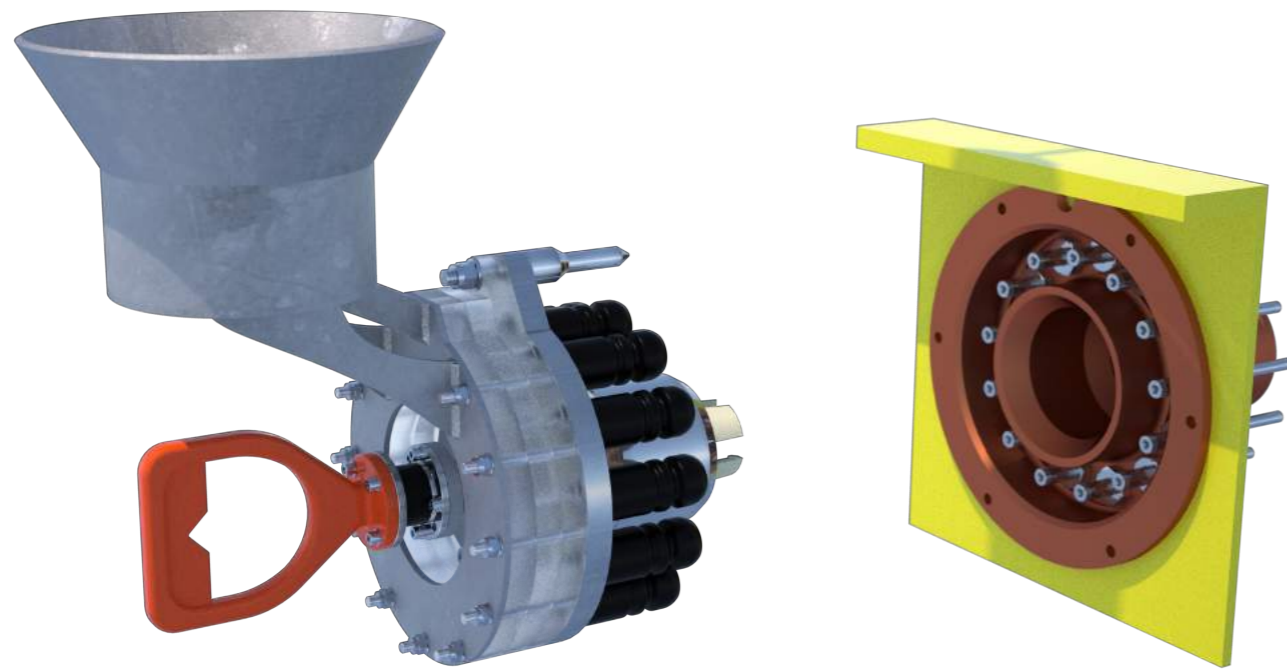
The MQC adapter is designed for acid treating TechnipFMC MQC13 Mk1 receptacles or MQC13 Mk2 receptacles. Soft rubber caps seal around the hydraulic connectors and enables a very efficient acid treatment. The adapter has a snap lock function with the fingers in centre of the adapter made from the engineering polymer PEEK.

MQC13 MK1/MK2	
Description	Unit
Part number	P008/P017
Length	533mm
Width	278mm/286mm
Height	469mm
Dry weight	28kg/27kg
Submerged weight	23kg/24kg

MQC13 Mk2

Availability:
This product is available for both purchase and rental. For purchase the estimated lead time from order is 6 weeks. Rental adapter is normally immediately available.

NORNE MQC
TECHNIPFMC

This adapter is designed for acid treating TechnipFMC Norne receptacles. Soft rubber caps seal around the hydraulic connectors and enables a very efficient acid treatment.

Availability:
The tool is not normally stocked. The tool is available for purchase with an estimated lead time from order of 4 weeks.
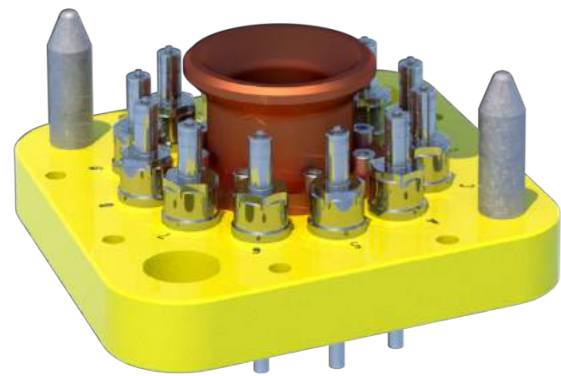
TECHNICAL DATA	
Description	Unit
Part number	P039
Length	449mm
Width	232mm
Height	628mm
Dry weight	20kg
Submerged weight	15kg

Availability:
This product is available for both purchase and rental. For purchase the estimated lead time from order is 3 weeks.
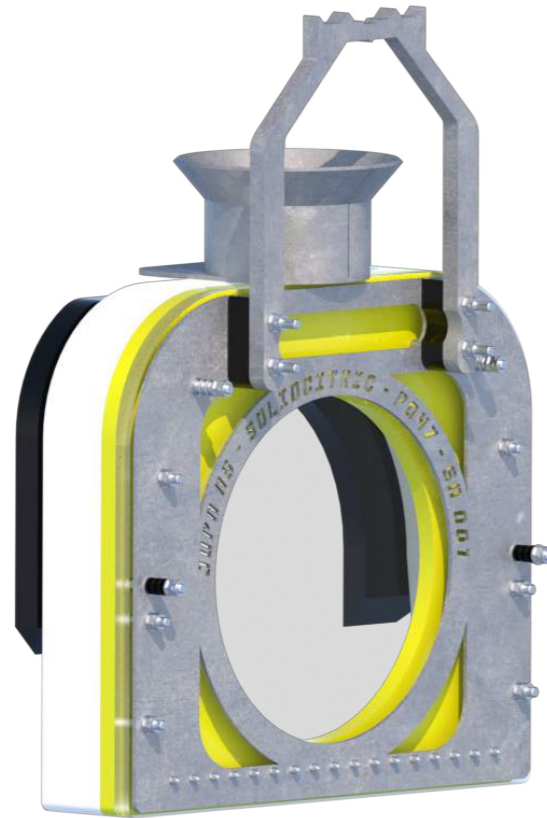
This horseshoe adapter is designed for cleaning of horizontal hubs with limited ROV access. This concept can be adapted to most hub sizes.
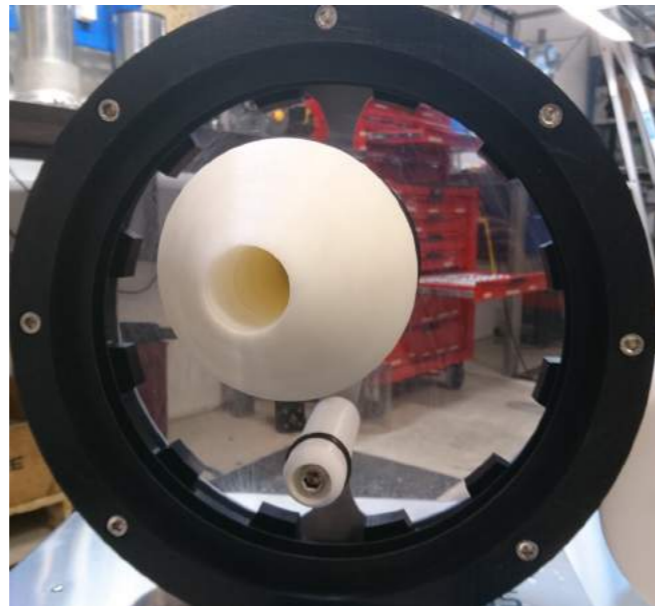

TECHNICAL DATA	
Description	**Unit**
Part number	P047
Length	270mm
Width	600mm
Height	808mm
Dry weight	41kg
Submerged weight	17kg

This adapter is designed for cleaning TechnipFMC KC4-10 hub.

Availability:
This tool is available for both purchase and rental. For purchase the estimated lead time from order is 4 weeks. Rental adapter is normally immediately available.

TECHNICAL DATA	
Description	**Unit**
Part number	P040
Height	565mm
Diameter	435mm
Length	553mm
Dry weight	21kg
Submerged weight	9kg
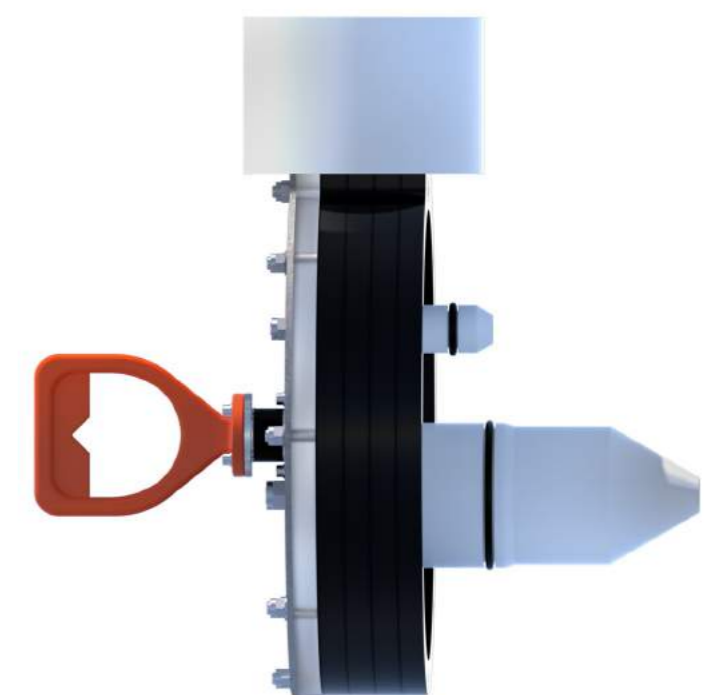
4" TREE CAP HUB ADAPTER

KC4.2-12 ADAPTER

This adapter is designed for acid cleaning of 4" TechnipFMC Tree Cap (TC) hubs. The adapter has a simple construction with internal seals for providing an efficient and localised acid treatment of 4" TC hubs. The SolidCitric cartridge is inserted into the top of the adapter.

Availability:
This product is available for both purchase and rental. For purchase the estimated lead time from order is 3 weeks.
Rental adapter is normally immediately available.

This adapter is designed for acid cleaning of TechnipFMC KC4.2-12 hub.

Availability:
This product is available for purchase. Estimated lead time from order is 4 weeks.

TECHNICAL DATA	
Description	Unit
Part number	P014
Height	384mm
Diameter	339mm
Dry weight	14kg
Submerged weight	12kg

TECHNICAL DATA	
Description	Unit
Part number	P064
Height	384mm
Diameter	339mm
Dry weight	17kg
Submerged weight	-0,5kg

18 ¾" HUB ADAPTER
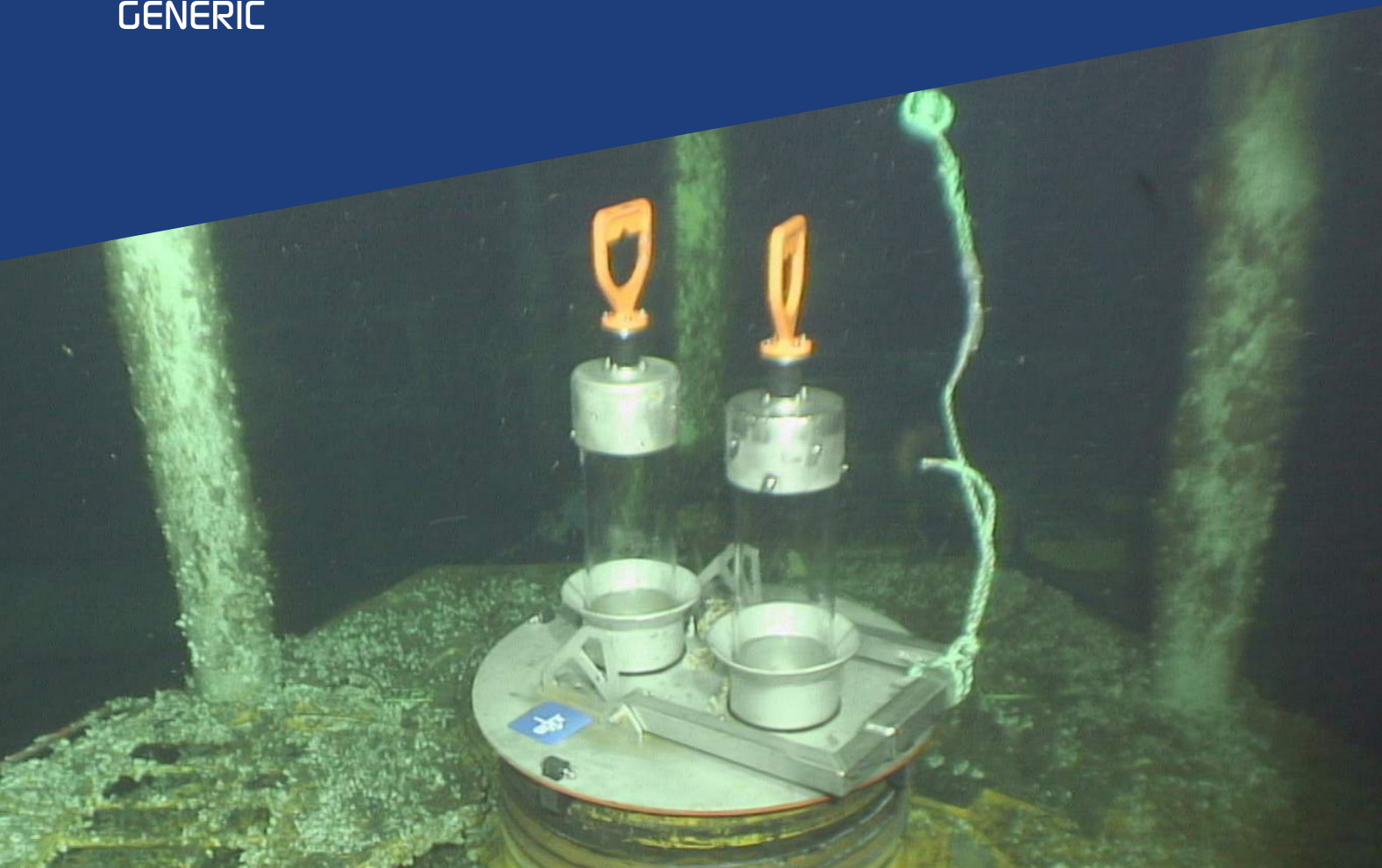
This adapter is designed for cleaning 18 ¾" hubs using SolidCitric. Various interface inserts can be mounted to the adapter in order to fit any 18 ¾" configuration. The tool is fitted with two SolidCitric cartridge slots if a large volume is required to be saturated.

Availability:
This product is normally immediately available for both purchase and rental.

TECHNICAL DATA	
Description	**Unit**
Part number	P009
Diameter	750mm
Dry weight	33kg + insert
Submerged weight	27kg + insert

18 ¾" w/ITC
Aker Solutions

18 ¾" w/ITC
TechnipFMC

18 ¾" w/THISL
TechnipFMC

12" WING HUB ADAPTER

This adapter is designed for cleaning TechnipFMC 12" WingHub using SolidCitric. The tool can also be used to clean TechnipFMC 13 5/8" re-entry hubs and choke bridge hubs.

Availability:
This product is normally immediately available for both purchase and rental.

TECHNICAL DATA	
Description	**Unit**
Part number	P031
Diameter	602mm
Height	269mm
Dry weight	26kg
Submerged weight	18kg
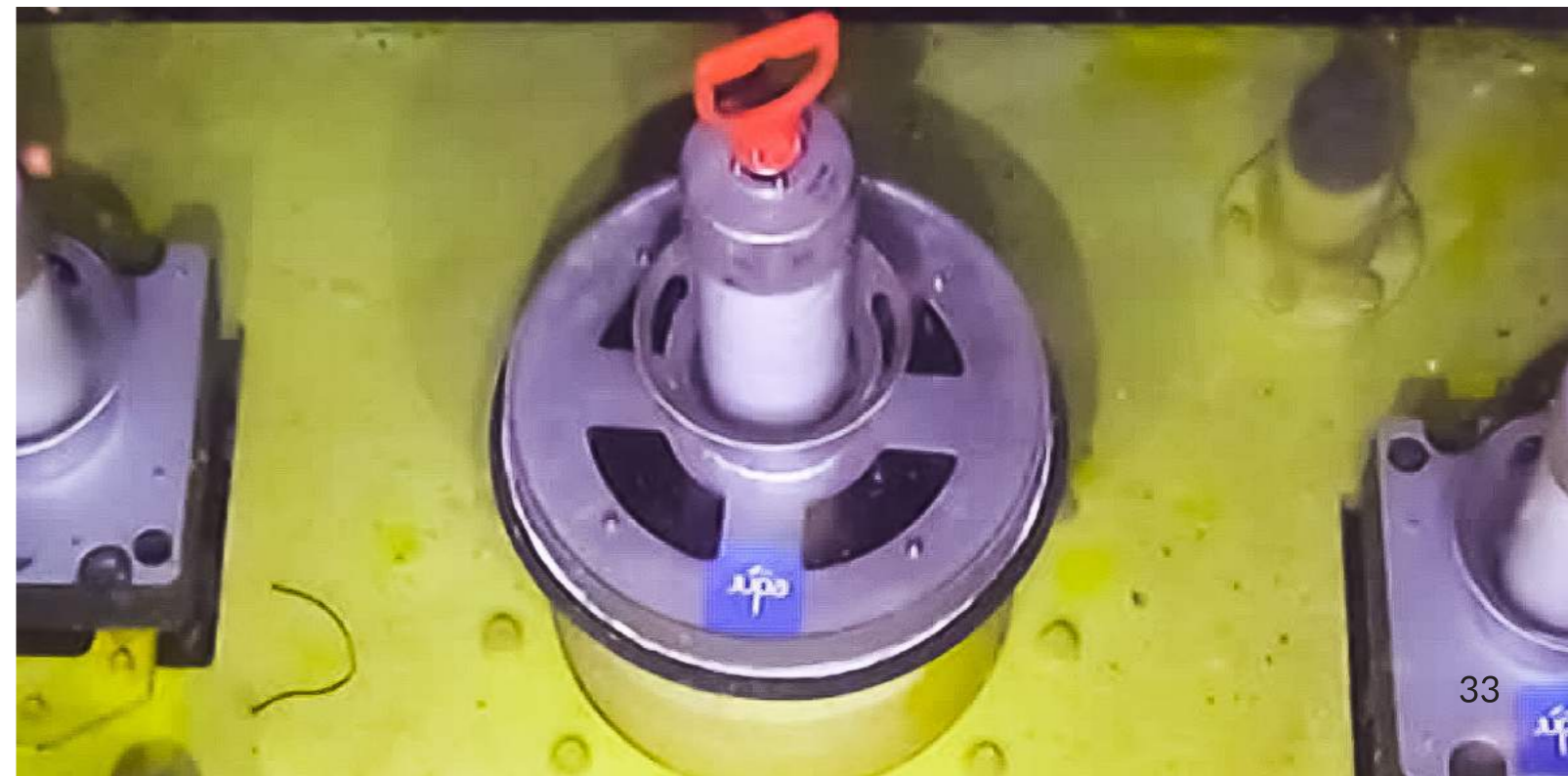
12" MANIFOLD HUB ADAPTER
AKER SOLUTIONS

This horseshoe adapter is designed for acid treating Aker Solutions HCM IB 12"-5" + 2x 2". The handle is lowered downwards after landing on the hub; in effect sealing the 5" bore with a stab while a compression plate squeezes front seal towards the hub face. It is compatible with our standard 6 and 12 kg SolidCitric cartridges.
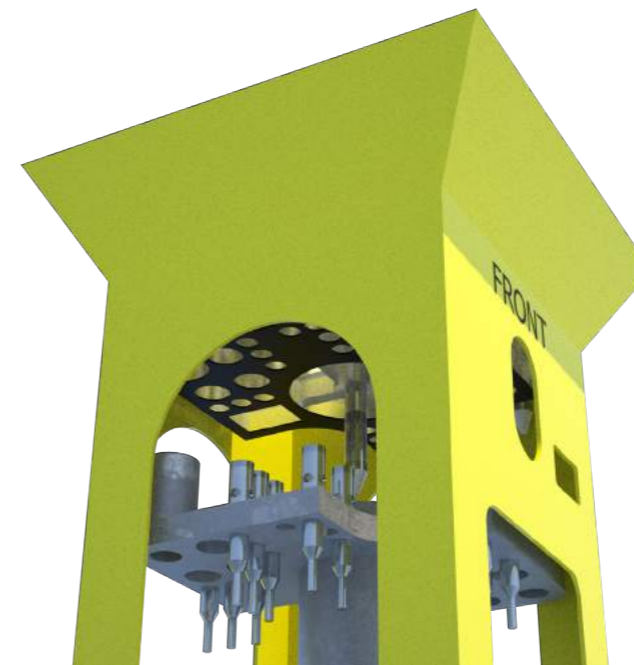
Availability:
This product is available for purchase. Estimated lead time from order is 4 weeks.
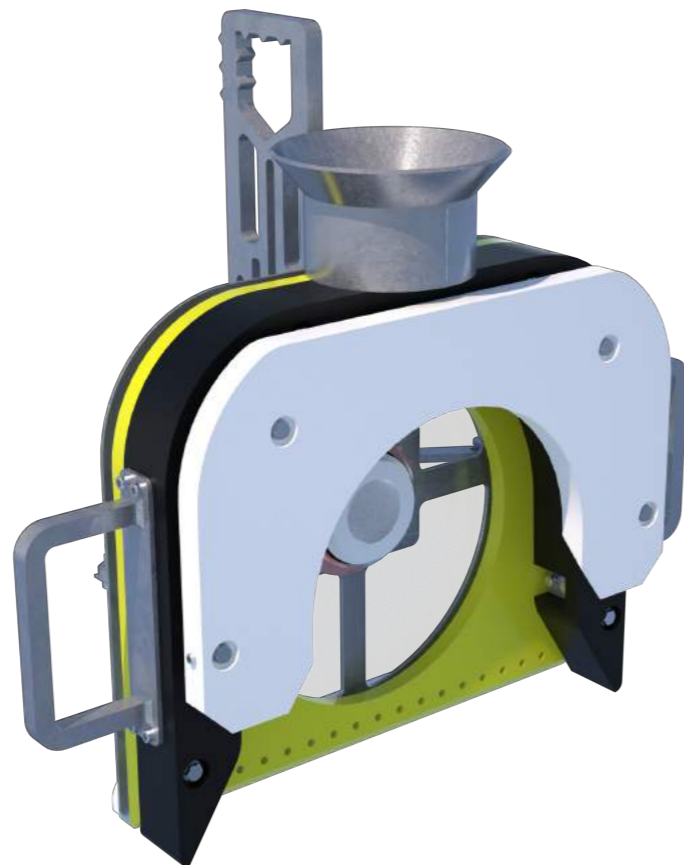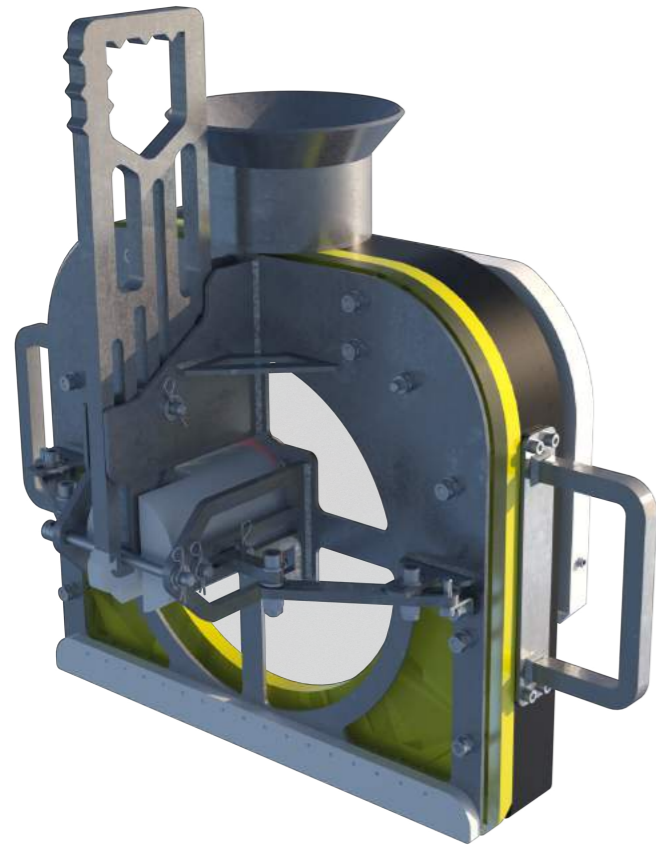
TECHNICAL DATA	
Description	**Unit**
Part number	P073
Length	390mm
Width	850mm
Height	759mm
Dry weight	57kg
Submerged weight	29,1kg

WE ARE READY TO DESIGN
THE NEXT ADAPTER

We at Jupa are ready to design the adapter you need for your application.

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