ActiveSET™ CRTe-1.0

VOLANT

Specification Summary

ActiveSET™ CRTe® External Grip Casing Running Tool

The Volant® ActiveSET CRTe® casing running tool is fully mechanical and designed for casing running or drilling with top-drive equipped rigs to make up, break out, reciprocate, rotate, fill, circulate, and cement casing and liner strings, reducing non-productive time and associated costs. A simple rig-up and rig-down further increase operational efficiency.

- The ActiveSET™ release feature, which must be installed with the vCAM™ latch mechanism, streamlines tool activation to a single-step process, which eliminates the need to manage set-down load while simultaneously rotating to the right.
- The vCAM latch mechanism provides the CRTe tool with a position-based latching function and enables disengagement of the CRTe tool by both the familiar operation of setting down and rotating to the left or by setting down directly into the latch from the break-out position.
- All CRTe tool models feature a float cushion for absorbing hoist loads. The float cushion can be disabled with a Float Lock insert if desired.
- All configurations are mechanically activated in tension and both rotational directions by top-drive control using patented TAWG® torque activated wedge grip technology.
- All CRTe tool models can be equipped with a Bumper Latch, which improves the safety and reliability with a redundant latch system that prevents engagement of the CRTe tool until the Bumper is compressed against the casing interface.

Starting from the bell diameter of the base tool, selectable sizes of dies (all of which can be designed for Corrosion Resistant Alloy [CRA] casing running) are used to configure the CRTe tool to support gripping casing of decreasing external diameter.

ActiveSET CRTe-1.0 with Grip Module 5.5 in.
CRTe-1.0GM5.5

ActiveSET CRTe-1.0 with Grip Module 7.75 in.
CRTe-1.0GM7.75

Drive Module[1]

CRTe Maximum Load Capacities	Hoist[2]	short tons (tonne)	500 (453)
	Torque	ft.lb. (N.m)	40,000 (54,200)
Set-down Load Capacity[3]		short tons (tonne)	200 (181)
Typical Circulation Pressure Capacity[4,5]		psi (MPa)	5,000 (34.4)
Maximum Pressure End-load		short tons (tonne)	150 (136)
Maximum Pressure End-load with Retractable Stinger		short tons (tonne)	50 (45)
Float Length (Float Tool Only)		in. (mm)	6.0 (150)
Through-Hole Diameter		in. (mm)	1.25 (31.5)
Maximum Flow Rate[6]		gpm (m^3/min.)	449 (1.70)
Maximum Rotational Speed[7]		rpm	Unlimited
Tool Joint			NC50
Turns to Stroke Out[8]			1.45

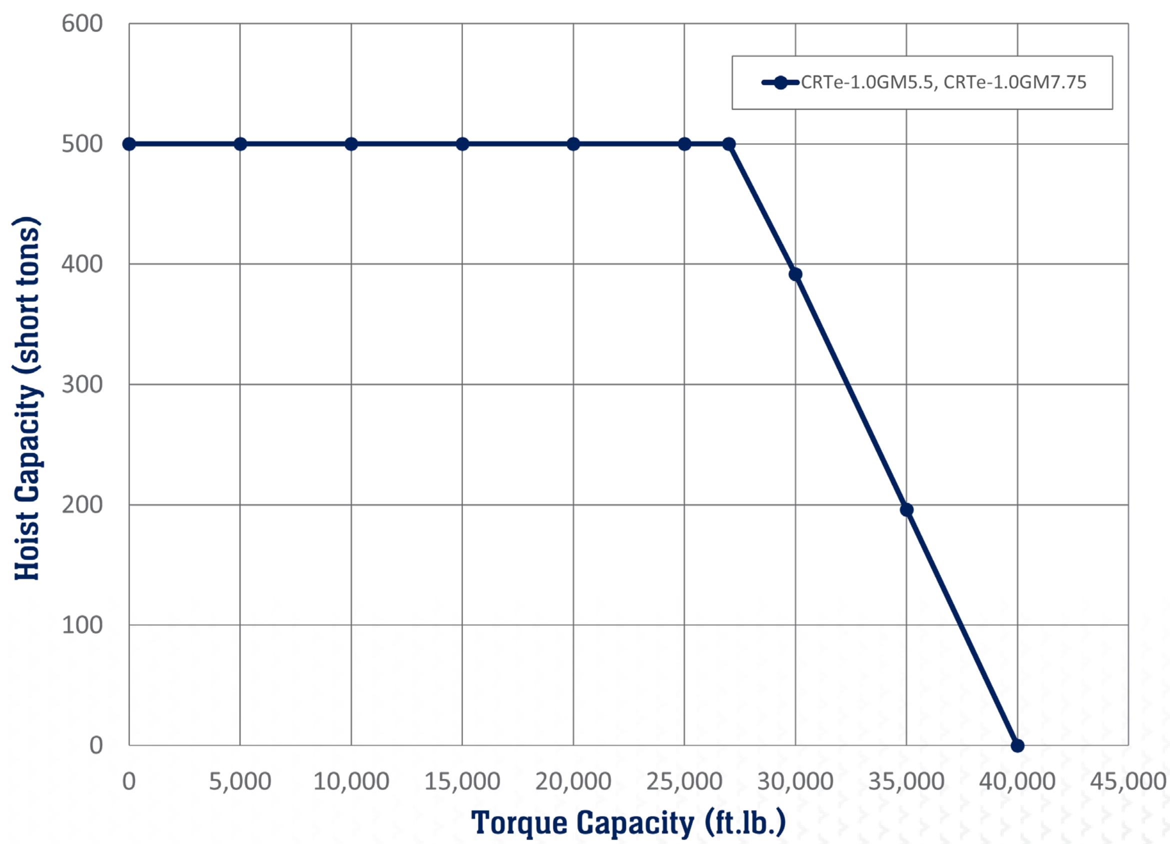
106768**B**

Configuration Characteristics[9]

Configuration Characteristics[9]		CRTe-1.0GM5.5	CRTe-1.0GM7.75
Overall Tool Length with Retractable Stinger	in. (mm)	87.6 (2,230)	95.5 (2,430)
Overall Tool Length with Fixed Mandrel Extension	in. (mm)	95.5 (2,430)	103.4 (2,630)
Min. Recommended Stump Height with Retractable Stinger	in. (mm)	42.0 (1,070)	46.0 (1,170)
Min. Recommended Stump Height with Fixed Mandrel Extension	in. (mm)	50.0 (1,270)	56.0 (1,425)
Maximum Tool Diameter	in. (mm)	15.0 (385)	16.3 (415)
Approximate Tool Weight	lb. (kg)	2,359 (1,071)	2,958 (1,342)
Diametrical Stroke	in. (mm)	1.37 (34.5)	1.37 (34.5)
Die Range	in. (mm)	3.50 (88.90) – 5.50 (139.70)	3.50 (88.90) – 7.63 (193.68)

Combined Load Operation Curve

The graph below illustrates the full hoist and torque capabilities of the CRTe tool. Please refer to the *Drive Module* table on *Page 1* for the CRTe tool's maximum hoist and torque capacities.



Tool Selection Guide

Step 1: Base Tool Selection

The CRTe tool is available in two base tool configurations. The ***Drive Module*** and ***Configuration Characteristics*** tables contain the capacities and overall dimensions of each base tool.

The operating hoist, torque, set-down load capacity, and maximum flow rate must each be lower than or equal to its respective base tool capacity.

If combined hoist and torque is required for the casing running job, the combined hoist and torque point must fall below or on the ***Combined Load Operation Curve***.

Step 2: Die Selection

Casing with a nominal pipe size below 5.50 in. (139.70 mm) can be used with the CRTe-1.0GM5.5, and casing with a nominal pipe size below 7.63 in. (193.8 mm) can be used with the CRTe-1.0GM7.75.

Find the appropriate die based on casing size in the ***Standard Dies*** tables on ***Page 4***.

Step 3: Die/Casing Hoist Capacity

The CRTe tool's Maximum Hoist Capacity is based on API Specification 8C's requirements, but there is a separate Die/Casing Hoist Capacity due to inefficiencies between the dies and the casing. This Die/Casing Hoist Capacity must be determined in pre-job planning to avoid excessive casing deformation.

The lower of these two capacities shall be the limiting factor.

$F_{die} = \eta_{die} \times F_{casing}$

F_{die} is the Die/Casing Hoist Capacity due to die/casing interaction.
η_{die} (Die Efficiency) is the die-to-pipe-body load efficiency.
F_{casing} is the Plain End Pipe Body Yield found in API TR 5C3.

For example, in API TR 5C3 the Plain End Pipe Body Yield for 5.50 in. x 20.0 ppf L80 (139.70 mm x 29.76 kg/m L80) casing is 466,000 lb. (2,074 kN). The Die Efficiency for die 81813, which will be used to run this casing, is 80%. (See the ***Standard Dies*** tables on ***Page 4***.)

Therefore, the Die/Casing Hoist Capacity is:

80% × 466,000 lb. = 372,800 lb. = 186.4 short tons; ***or***
80% × 2,074 kN = 1,659 kN = 169.2 tonne

Step 4: Die/Casing Torque Capacity

The CRTe tool's Maximum Torque Capacity is based on API Specification 8C's requirements, but there is a separate Die/Casing Torque Capacity due to the Torque Factor between the dies and the casing. This Die/Casing Torque Capacity must be determined in pre-job planning to avoid excessive casing deformation.

The lower of these two capacities shall be the limiting factor. If no Torque Factor is provided for the die, the Maximum Torque Capacity shall be the limiting factor.

$T_{die} = K_{torque} \times W_{casing} \times \sigma Y_{casing}$

T_{die} is the Die/Casing Torque Capacity due to die/casing interaction.
K_{torque} is the Torque Factor in the ***Standard Dies*** tables on ***Page 4***.
W_{casing} is the casing weight.
σY_{casing} is the casing material API Grade's Yield Strength found in API TR 5C3.

In API TR 5C3, the Yield Strength for L80 casing is 80,000 psi (551.5 MPa). Therefore, the Die/Casing Torque Capacity for running 5.50 in. 20.0 ppf L80 (139.70 mm x 29.76 kg/m L80) casing with die 81813 is:

0.02812 ft.lb./psi/ppf × 20.0 ppf × 80,000 psi = 44,992 ft.lb.; ***or***
3.715 N.m/MPa/(kg/m) × 29.76 kg/m × 551.5 MPa = 60,972 N.m

Step 5: Hoist Capacity Pressure Reduction

The Maximum Hoist Capacity and the Die/Casing Hoist Capacity must be further reduced due to the circulation pressure in relation to the casing inner diameter and the casing seal.

This Hoist Capacity Pressure Reduction must be determined in pre-job planning and subtracted from the limiting factor hoist capacity determined in ***Step 3***.

$F_{EndPressure} = P \times (A_{casing} - 2.0 \text{ sq. in.})$

$F_{EndPressure}$ is the amount by which the limiting factor hoist capacity must reduce due to pressure end-load.
P is the circulation pressure in the casing.
A_{casing} is the casing's nominal inner diameter cross-sectional area.
2.0 sq. in. represents the swept area of the casing seal.

For example, for circulation pressure of 500 psi (3.4 MPa) and casing nominal ID of 4.778 in. (121.36 mm) the Hoist Capacity Pressure Reduction is:

$\pi \times (4.778 \text{ in.} / 2)^2 = 17.93$ sq. in.
500 psi × (17.93 sq. in. – 2.0 sq. in.) = 7,965 lb. = 4.0 short tons; ***or***
$\pi \times (121.36 \text{ mm} / 2)^2 = 11,568 \text{ mm}^2$
3.4 MPa × (11,568 mm² – 1,290 mm²) = 34,945 N = 3.6 tonne.

Therefore, the Maximum Hoist Capacity for the CRTe-1.0 tool reduces to 500.0 – 4.0 = 496.0 short tons (449.4 tonne), and the Die/Casing Hoist Capacity calculated in ***Step 3*** for die 81813 reduces to 186.4 – 4.0 = 182.4 short tons (165.6 tonne).

Please contact Volant for further information.

Standard Dies[10]

CRTe-1.0GM5.5

Die P/N	Nominal Pipe Size		Max. Coupling Diameter		Max. Coupling Length		Die Efficiency (η_{die})	Torque Factor (K_{torque})	
	in.	mm	in.	mm	in.	mm		ft.lb./psi/ppf	N.m/MPa/ (kg/m)
102965	3.50	88.90	4.64	117.5	13.5	340	80%	0.04007	5.294
82155	4.50	114.30	5.64	143.0	13.5	340	80%	0.03467	4.581
82408	5.00	127.00	6.16	156.0	13.5	340	80%	0.03081	4.071
81813	5.50	139.70	6.60	167.5	13.5	340	80%	0.02812	3.715

CRTe-1.0GM7.75

Die P/N	Nominal Pipe Size		Max. Coupling Diameter		Max. Coupling Length		Die Efficiency (η_{die})	Torque Factor (K_{torque})	
	in.	mm	in.	mm	in.	mm		ft.lb./psi/ppf	N.m/MPa/ (kg/m)
102965	3.50	88.90	4.93	125.0	13.5	340	80%	0.04007	5.294
82155	4.50	114.30	5.93	150.5	15.4	390	80%	0.03467	4.581
82408	5.00	127.00	6.42	163.0	15.4	390	80%	0.03081	4.071
81813	5.50	139.70	6.92	175.5	15.4	390	80%	0.02812	3.715
101730	6.00	152.40	7.29	185.0	15.4	390	80%	0.03060	4.043
101373	6.63	168.28	7.91	200.5	15.4	390	80%	0.02620	3.462
82854	7.00	177.80	8.19	208.0	15.4	390	80%	0.02577	3.405
81839	7.63	193.68	9.01	228.5	15.4	390	80%	0.02371	3.133

1. Characteristics are based on standard CRTe tool components and are independent of specific limitations of accessories such as dies.
2. Higher hoist capacities up to 550 short tons (500 tonne) are available upon special request.
3. Maximum allowable set-down load applied to the CRTe tool. Some set-down load may be reacted through the coupling. This capacity does not consider bearing load limitations of the coupling.
4. Typical Circulation Pressure Capacity can be limited by packer cup pressure capacity and pressure end-load, and may be less than indicated if alternative seal arrangements are used or if it surpasses the maximum allowable pressure end-loads.
5. CRTe tool pressure end-load depends on the type of casing seal arrangement. The result must not exceed the stated Maximum Pressure End-load.
6. Maximum Flow Rate is based on minimizing erosion rates when using typical fluids. Erosion rates may vary based on fluid contents. Please inspect CRTe tool bore regularly.
7. When rotating a casing/liner string during running/drilling operations, Maximum Rotational Speeds are governed by top-drive or casing connection specific limits.
8. Turns to Stroke Out is the rotational limit during CRTe tool make-up.
9. Overall tool length and weight will vary depending on configuration used and casing seal arrangement.
10. Values given are valid for all pipe weights specified in API 5CT.