Volant Casing Running Tools (CRTi2-8.63)

CRTi™ Internal Grip Casing Running Tool

Volant's CRTi casing running tool is designed for casing running or drilling with top drive equipped rigs to makeup, breakout, reciprocate, rotate, fill, circulate and cement casing and liner strings, reducing non-productive time and associated costs. Casing drilling is achieved through the standard tool configuration, but if increased flow is desired, Volant's Highflow* option features a larger through hole for additional fluid flow. This tool is mechanically activated in tension and both rotational directions solely by top drive control using TAWG™ wedge grip technology.

This patented architecture puts control in the hands of the driller, reducing the need for third party support to run casing. Intuitive operations for pipe engagement and release closely emulate the familiar make and break steps used to run drill pipe – stab, rotate to the right to engage and reverse to disengage. Similarly, rig in and rig out steps are simple, intuitive and efficient.

Starting from the insertion diameter of the base tool (cage OD), selectable sizes of integral jaws/dies are used to configure the CRTi to support gripping casing of increasing internal diameter. Through the use of a patented extended reach die structure, the gripping diameter can be further increased to include casing sizes much greater than the base tool.

Tool Model: CRTi2-8.63 Specification Summary

Base Tool Characteristics[1]

CRTi Rated Load Capacity	Hoist	ton (tonne)	690 (625)
	Torque	ft.lbs (N.m)	85,000 (115,200)
Combined Load Large Hoist	Hoist	ton (tonne)	575 (521)
	Torque	ft.lbs (N.m)	40,000 (54,200)
Combined Load High Torque	Hoist	ton (tonne)	475 (430)
	Torque	ft.lbs (N.m)	70,000 (94,900)
Set-Down Load Capacity[2]		ton (tonne)	110 (99)
Typical Circulation Pressure Limit[3]		psi (MPa)	5,000 (34.4)
Maximum Pressure End Load		ton (tonne)	500 (453)
Base Tool Length[4]		in (mm)	65.6 (1,670)
Diametrical Stroke		in (mm)	0.75 (19.0)
Through Hole		in (mm)	2.0 (51)
Maximum Flow Rate[5]		gpm (m^3/min)	1,161 (4.40)
Tool Joint			6.63 REG
Turns to Stroke Out			1.25[6] / 0.6

Tool Configuration with

Integral Slip Dies | Extended Slip Dies | Extended Reach Dies and Bumper Extension

Give us a problem. Or just drop us a line if you want to know more.

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Certified System ISO 9001 Quality

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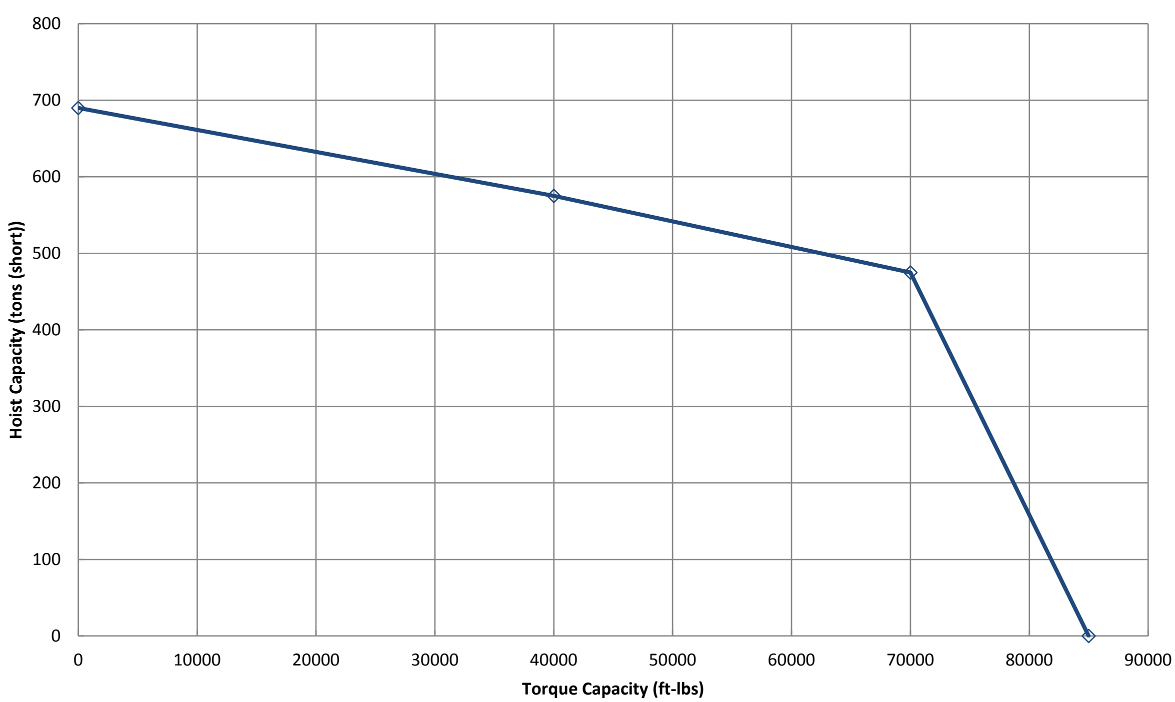
Tool Model: CRTi2-8.63 Specification Summary

Casing Seal Assembly and Tool Length[4]

Casing Seal Description	Seal Type	Casing Size in (mm)	Overall Tool Length in (mm)
Swivel Casing Seal	Packer Cup	8.63 (219.1) - 13.38 (339.7)	78.6 (2,000)
	Wedge Seal	13.38 (339.7) - 30.0 (762.0)	78.6 (2,000)

Combined Load Operation Curve

Please refer to the Base Tool Characteristics on page 1 of this Specification Summary for numeric values such as CRTi Rated Load Capacity, Combined Load Large Hoist, and Combined Load High Torque illustrated in the graph below:



Tool Selection Guide

Step 1: Base Tool Selection The CRTi is available in a variety of dimensions and ratings. The Base Tool Characteristics table contains the ratings and overall dimensions of the tool. The required hoist, torque, set-down load capacity and maximum flow rate must be lower than or equal to the base tool rating. 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 All API casing sizes and weights with drift diameter above 7.38 in (187.4 mm) are available for this tool. Find the appropriate die for casing size and weight in the die table below. Some dies can run a range of casing weights.

Step 3: Die Hoist Capacity Tool hoist rating is based on API Specifications 8C; however casing load limit is further con-strained by local interaction of slip dies with casing, which must not exceed the efficiency indicated for individual slip die sizes to avoid excess deformation. The slip to casing interaction hoist limit (F_{die}) can be found by the following formula where efficiency is the slip to pipe body load efficiency number (listed in the following table for every die) and F_{casing} is the casing hoist limit found in API Bulletin 5C2.

F_{die} = efficiency x F_{casing}

For example, from API 5C2 the pipe body yield for 9.63 in x 40.0 ppf L80 (244.5 mm x 59.53 kg/m L80) casing is 916,000 lbs (415.5 tonne). The slip efficiency for slip die 81756 used to run this casing is 80%. Therefore, the die hoist limit is:

80% × 916,000 lbs = 732,800 lbs = 366.4 ton

or

80% × 415.5 tonne = 332.4 tonne

In case the base tool hoist rating is smaller than the calculated die hoist limit, the base tool hoist rating will be limiting.

Step 4: Die Torque Capacity $T_{die} = K_{torque} \times W_{casing} \times \sigma Y_{casing}$

where T_{die} is the torque limit due to slip die/casing interaction,
K_{torque} is the torque factor,
W_{casing} is the desired casing weight in ppf (kg/m), and
σY_{casing} is the casing yield strength in psi (MPa)

If no value is provided, tool rating will be limiting for all standard casing grades. For example, for die 81756 to run 9.63 in x 40.0 ppf L80 (244.5 mm x 59.53 kg/m L80) casing, the die torque limit is:

0.02701 ft.lbs/psi/ppf × 40.0 ppf × 80,000 psi = 86,432 ft.lbs

or

3.569 N.m/MPa/(kg/m) × 59.53 kg/m × 551.6 MPa = 117,194 N.m

Where the base tool torque capacity is lower than the die torque capacity, the tool is limited to base tool torque capacity.

Step 5: Effect of Circulation Pressure CRTi hoist capacity must be reduced by the pressure end load during circulation. The hoist reduction ($F_{EndPressure}$) depends on circulation pressure (P), casing nominal ID (ID_{casing}) and CRTi through hole ($ID_{mandrel}$).

$F_{EndPressure} = 0.79 \times P \times (ID^2_{casing} - ID^2_{mandrel})$

For example, for circulation pressure of 500 psi (3.45 MPa) and casing nominal ID of 8.84 in (224.5 mm) the hoist reduction is:

0.79 × 500 psi × ((8.84 in)^2 - (2.0 in)^2) = 29,288 lbs ~ 14.6 ton

or

0.79 × 3.44 MPa × ((224.5 mm)^2 - (50.8 mm)^2) = 129,955 N ~ 13.3 tonne

Therefore, the maximum hoist for this tool reduces to 690.0 - 14.6 = 675.4 ton (612.7 tonne) or the maximum hoist for die 81756 (in step 3) must reduce to 366.4 - 14.6 = 351.8 ton (319.1 tonne).

Please contact Volant for further information.

Summary of Selected Slip Die Sizes[7]

Die P/N	Nominal Pipe Size		Max. Pipe Weight[8] (W_{casing})		Min. Pipe Weight[9] (W_{casing})		Die Curv. Diameter		Max. Tool Diameter		Approximate Tool Weight		Slip to Pipe Body Load Efficiency	Torque Factor (K_{torque})	
	(in)	(mm)	(ppf)	(kg/m)	(ppf)	(kg/m)	(in)	(mm)	(in)	(mm)	(lbs)	(kg)	(% Fy)	(ft.lbs/psi/ppf)	(N.m/MPa/(kg/m))
81024	8.63	219.1	36.0	53.57	24.0	35.72	8.04	204.5	20.0	510	1,350	620	80%	0.02894	3.824
82301	9.63	244.5	32.0	47.62	32.0	47.62	9.19	233.5	20.0	510	1,350	620	80%	0.02817	3.722
81756	9.63	244.5	43.5	64.74	32.0	47.62	8.91	226.5	20.0	510	1,350	620	80%	0.02701	3.569
81154	9.63	244.5	53.5	79.62	40.0	59.53	8.71	221.5	20.0	510	1,350	620	80%	0.0291	3.845
81881	9.63	244.5	58.4	86.91	47.0	69.94	8.60	218.5	20.0	510	1,350	620	80%	0.03074	4.061
82276	10.75	273.1	40.5	60.27	32.8	48.81	10.22	260.0	20.0	510	1,500	690	80%	0.02477	3.273
82275	10.75	273.1	51.0	75.90	40.5	60.27	10.02	254.5	20.0	510	1,500	690	80%	0.02554	3.374
82910	10.75	273.1	60.7	90.33	45.5	67.71	9.83	250.0	20.0	510	1,500	690	80%	0.0262	3.462
81255	10.75	273.1	65.7	97.77	51.0	75.90	9.73	247.0	20.0	510	1,500	690	80%	0.02647	3.497
81494	10.75	273.1	73.2	108.93	60.7	90.33	9.57	243.5	20.0	510	1,500	690	80%	0.02718	3.591
81138	10.75	273.1	79.2	117.86	71.1	105.81	9.40	239.0	20.0	510	1,500	690	80%	0.02785	3.680
81495	11.75	298.5	60.0	89.29	47.0	69.94	10.94	278.0	20.0	510	1,600	730	80%	0.02263	2.990
81757	11.75	298.5	71.0	105.66	60.0	89.29	10.75	273.5	20.0	510	1,600	730	80%	0.02348	3.102
100703	11.75	298.5	82.6	122.92	71.0	105.66	10.54	268.0	20.0	510	1,600	730	80%	0.02425	3.204
82039	12.75	323.9	58.4	86.91	50.0	74.41	12.03	306.0	20.0	510	1,850	840	71%	0.02012	2.658
82168	13.38	339.7	54.5	81.10	48.0	71.43	12.78	325.0	20.0	510	2,100	960	74%	0.02048	2.706
81897	13.38	339.7	61.0	90.78	48.0	71.43	12.68	322.5	20.0	510	2,100	960	74%	0.02048	2.706
82164	13.38	339.7	68.0	101.20	54.5	81.10	12.58	320.0	20.0	510	2,100	960	75%	0.02094	2.766
81150	13.38	339.7	72.0	107.15	61.0	90.78	12.52	318.0	20.0	510	2,100	960	75%	0.0213	2.814
82588	13.38	339.7	77.0	114.59	61.0	90.78	12.44	316.0	20.0	510	2,100	960	75%	0.0213	2.814
83154	13.38	339.7	86.0	127.98	72.0	107.15	12.28	312.0	20.0	510	2,100	960	76%	0.02173	2.871
81431	16.0	406.4	65.0	96.73	65.0	96.73	15.42	392.0	20.0	510	2,500	1,140	59%	0.01627	2.149
81645	16.0	406.4	84.0	125.01	75.0	111.61	15.18	386.0	20.0	510	2,500	1,140	63%	0.01757	2.321
82100	16.0	406.4	97.0	114.35	84.0	125.01	15.03	382.0	20.0	510	2,500	1,140	61%	0.01713	2.263
81758	16.0	406.4	109.0	162.21	97.0	144.35	14.88	378.0	20.0	510	2,500	1,140	64%	0.01791	2.366
82532	16.77	426.0	77.0	114.59	69.4	103.28	16.09	409.0	20.0	510	2,600	1,180	55%	0.01548	2.045
81752	17.88	454.0	105.0	156.26	93.5	139.14	16.96	431.0	20.0	510	2,650	1,210	53%	0.01485	1.962
100665	18.0	457.2	117.0	174.12	117.0	174.12	16.94	430.5	20.0	510	2,650	1,210	56%	0.01577	2.083

Summary of Selected Slip Die Sizes[7] *(continued)*

Die P/N	Nominal Pipe Size		Max. Pipe Weight[8] (W_{casing})		Min. Pipe Weight[9] (W_{casing})		Die Curv. Diameter		Max. Tool Diameter		Approximate Tool Weight		Slip to Pipe Body Load Efficiency	Torque Factor (K_{torque})	
	(in)	(mm)	(ppf)	(kg/m)	(ppf)	(kg/m)	(in)	(mm)	(in)	(mm)	(lbs)	(kg)	(% Fy)	(ft.lbs/psi/ ppf)	(N.m/MPa/ (kg/m))
82976	18.63	473.1	87.5	130.21	87.5	130.21	17.88	454.5	20.0	510	2,800	1,280	45%	0.01269	1.676
81434	18.63	473.1	94.5	140.63	87.5	130.21	17.90	455.0	20.0	510	2,800	1,280	51%	0.01415	1.869
81566	18.63	473.1	97.7	145.39	87.5	130.21	17.85	453.5	20.0	510	2,800	1,280	55%	0.0152	2.008
82101	18.63	473.1	111.0	165.19	97.7	145.39	17.71	450.0	20.0	510	2,800	1,280	55%	0.01525	2.015
82675	18.63	473.1	117.0	174.12	111.0	165.19	17.63	448.0	20.0	510	2,800	1,280	56%	0.01525	2.015
81880	18.63	473.1	139.0	206.85	136.0	202.39	17.39	442.0	20.0	510	2,800	1,280	56%	-	-
82300	20.0	508.0	94.0	139.89	94.0	139.89	19.31	490.5	20.0	510	3,000	1,370	49%	0.01362	1.799
81759	20.0	508.0	106.5	158.49	94.0	139.89	19.19	487.5	20.0	510	3,000	1,370	49%	0.01362	1.799
81483	20.0	508.0	133.0	197.93	129.3	192.42	18.92	481.0	20.0	510	3,000	1,370	50%	0.01418	1.873
101434	20.0	508.0	147.0	218.76	129.3	192.42	18.78	477.5	20.0	510	3,000	1,370	49%	0.01387	1.832
82740	20.0	508.0	169.0	251.50	166.4	247.63	18.58	472.0	20.0	510	3,000	1,370	52%	-	-
82102	22.0	558.8	184.5	274.57	184.5	274.57	20.53	521.5	28.0	715	3,100	1,410	45%	-	-
81750	22.0	558.8	224.0	333.35	224.0	333.35	20.11	511.0	28.0	715	3,100	1,410	40%	-	-
100029	24.0	609.6	176.0	261.92	176.0	261.92	22.72	577.5	28.0	715	3,100	1,410	38%	0.01086	1.435
101875	24.0	609.6	186.0	276.80	171.3	254.92	22.66	576.0	28.0	715	3,100	1,410	38%	0.01086	1.435
101050	24.0	609.6	201.0	299.12	201.0	299.12	22.47	571.0	28.0	715	3,100	1,410	39%	0.01131	1.494
81462	26.0	660.4	275.0	409.24	275.0	409.24	24.09	612.0	28.0	715	3,700	1,680	37%	-	-
82486	28.0	711.2	222.7	331.41	222.7	331.41	26.59	675.5	32.0	815	4,400	2,000	27%	0.00783	1.034
82506	30.0	762.0	233.2	347.07	233.2	347.07	28.59	726.5	32.0	815	4,700	2,140	24%	0.00717	0.947

*For details and availability on the Highflow option contact Volant sales at +1 780.784.7099

1. Characteristics are based on standard tool components and are independent of specific limitations of cage and accessories.
2. Maximum allowable set-down load applied to the tool. Some set-down load may be reacted through the coupling. This rating does not take into account bearing load limitations of the coupling. Minimum makeup torque requirements specified in running procedure 100027 must be followed to realise full set-down load capacity.
3. CRTi tool circulation pressure capacity is generally governed by packer cup pressure capacity. Pressure capacity may be less than indicated if alternative seal arrangements are used.
4. Base tool length does not include casing seal assembly. Overall tool length depends on the casing seal arrangement.
5. Maximum flow rate is based on minimizing erosion rates when using typical fluids. Erosion rates may vary depending upon the fluid contents. Please inspect tool bore regularly.
6. Turns to Stoke Out is the rotational limit during tool makeup (this may be exceeded in combined load scenarios). The old style cams require 1.25 turns to stroke out.
7. Common die sizes shown. All API casing sizes and weights with drift diameter above 7.38 in (186.5 mm) are available.
8. Maximum pipe weight is defined by the API Specification 5CT drift diameter of the heaviest weight casing into which the CRTi tool assembled with the specified die set will fit.
9. Indicated minimum pipe weight is based on the assumption that control of average pipe inside diameter over die grip interval does not allow pipe body area reduction less than 3.5% from nominal and additionally takes into account tool wear allowances, die penetration, casing deformation and diametrical stroke.

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