

**.45-70 Govt - H&N TS HS 400gr - RS40**

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**LOT-TO-LOT VARIATIONS OF POWDERS, PRIMER SUBSTITUTION AND COMPONENT CHANGE OFTEN RAISE PRESSURES TO UNSAFE LEVELS. THE USER MUST ASSUME THE ENTIRE RISK OF USING THIS DATA FOR LOADING PURPOSES.**

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<b>User Data:</b>	<b>Date:</b> 3-Mär-2020	<b>Time:</b> 10:55:35	<b>File:</b> *.dat
<b>Comment</b>	<b>22" barrel - 64.77mm COL - 43.5gr start load - 487m/s - 1527bar</b>		
<b>Cartridge / Caliber</b>	<b>.45-70 Govt. CIP</b>	<b>Bullet</b>	<b>.458, 400, H&amp;N TS HS max.1700fps</b>
Maximum Average Pressure, allowed	2200 bar	31908 psi. (Piezo CIP)	with hollowbase
Groove Caliber	11.61 mm	0.457 in.	25.92 gm 400.0 gr.
Case Capacity, overflow	5.129 cm³	79.0 gr. H2O	25.45 mm 1.002 in.
Case Length	53.47 mm	2.105 in.	14.15 mm 0.557 in.
Cartridge O.A. Length	64.77 mm	2.550 in.	558.8 mm 22.0 in.
Shot Start / Init Pressure	110.0 bar	1595 psi.	Cross Section Area of Bore 1.0425 cm² 0.16159 in.²
<b>Propellant type</b>	<b>ReloadSwiss RS 40</b>		
Charge Weight	2.819 gm	43.5 gr.	Load Density 0.773 gm/cm³ 195.5 gr./in.³
Heat of Explosion, Potential	3990 J/gm	258.5 J/gr.	Energy Density of Charge 3085 J/cm³ 50554 J/in.³
Propellant Solid Density	1.6 gm/cm³	404.63 gr./in.³	Used Ratio of Specific Heats cp/cv 1.2293
Burning Rate Factor Ba	0.643 1/s		Weighting Factor 0.75
Burning Function Limit Z1	0.419		Prog.-/ Degressivity Factor a0 0.782
Factor b	1.494		Bulk Density 0.938 gm/cm³ 237.2 gr./in.³

**Calculated and Estimated Data:**

Bullet Shank Seating Depth	14.15 mm	0.557 in.	Capacity Displaced by Seated Bullet	1.484 cm³	0.0905 in.³
Useable Case Capacity	3.646 cm³	0.2225 in.³	Bullet Travel at Muzzle Exit	519.48 mm	20.45 in.
Loading Ratio("Density") / Filling	82.4 %		Charge Fraction Burnt at Shot Start	0.80 %	

**Predicted Data:**

Maximum Chamber Pressure	1527 bar	22148 psi.	Bullet Travel at Pmax	22.4 mm	0.88 in.
<b>at Muzzle Exit:</b>					
Bullet Velocity	486.6 m/s	1596 fps.	Pressure at Muzzle	230 bar	3332 psi.
Bullet Energy	3069 Joule	2264 ft.lbs.	Bullet Barrel Time	1.787 ms	
Propellant Burnt	83.5 %		Ballistic Efficiency	27.3 %	

Check Loading Manuals for Safe Minimum Charge Weight to Avoid Hazardous Ignition Conditions like Secondary Explosion Effects !

Real maximum (peak) of pressure is reached while bullet moves within barrel.

End of combustion occurs after the bullet's base passes muzzle.

**Table of incremented charges ranging from +10.0% to -20.0% of above specified charge**

**D A N G E R !** : Table data may exceed maximum average pressures ! Pressures exceeding SAAMI or CIP specs are printed underlined!

Diff. %	Charge Weight		Muzzle Vel.		Muzzle Energy		Max. Pressure		Muzzle Pressure		Prop.Burnt	B_Time	L.R./Filling
	Gramm	Grains	m/s	fps	Joule	ft.lbs	bar	psi	bar	psi	%	ms	%
-20.0	2.26	34.8	389	1276	1960	1446	873	12659	164	2374	70.9	2.292	66
-18.0	2.31	35.7	398	1307	2058	1518	924	13400	170	2471	72.2	2.238	68
-16.0	2.37	36.5	408	1339	2159	1593	978	14182	177	2568	73.6	2.184	69
-14.0	2.42	37.4	418	1371	2263	1669	1035	15007	184	2665	74.9	2.132	71
-12.0	2.48	38.3	428	1403	2370	1748	1094	15874	190	2761	76.2	2.083	73
-10.0	2.54	39.2	437	1435	2480	1829	1157	16788	197	2858	77.5	2.033	74
-8.0	2.59	40.0	447	1467	2592	1912	1224	17751	204	2954	78.8	1.980	76
-6.0	2.65	40.9	457	1499	2707	1997	1294	18766	210	3050	80.0	1.929	77
-4.0	2.71	41.8	467	1532	2825	2084	1367	19834	217	3145	81.2	1.880	79
-2.0	2.76	42.6	477	1564	2946	2173	1445	20962	223	3239	82.4	1.833	81
<b>Nominal</b>	<b>2.82</b>	<b>43.5</b>	<b>487</b>	<b>1596</b>	<b>3069</b>	<b>2264</b>	<b>1527</b>	<b>22148</b>	<b>230</b>	<b>3332</b>	<b>83.5</b>	<b>1.787</b>	<b>82</b>
+2.0	2.88	44.4	496	1629	3195	2357	1614	23404	236	3424	84.6	1.744	84
+4.0	2.93	45.2	506	1661	3324	2452	1705	24727	242	3514	85.7	1.701	86
+6.0	2.99	46.1	516	1694	3455	2548	1801	26123	248	3603	86.7	1.660	87
<b>+8.0</b>	<b>3.04</b>	<b>47.0</b>	<b>526</b>	<b>1726</b>	<b>3589</b>	<b>2647</b>	<b>1903</b>	<b>27596</b>	<b>254</b>	<b>3690</b>	<b>87.7</b>	<b>1.620</b>	<b>89</b>
<b>+10.0</b>	<b>3.10</b>	<b>47.9</b>	<b>536</b>	<b>1759</b>	<b>3726</b>	<b>2748</b>	<b>2010</b>	<b>29153</b>	<b>260</b>	<b>3775</b>	<b>88.7</b>	<b>1.582</b>	<b>91</b>

**Results caused by ±10% powder lot-to-lot burning rate variation using nominal charge**

Data for burning rate increased by 10% relative to nominal value :													
Nominal	2.82	43.5	520	1707	3508	2588	1841	26704	245	3558	91.4	1.646	82
Data for burning rate decreased by 10% relative to nominal value :													
Nominal	2.82	43.5	447	1468	2596	1914	1251	18138	206	2984	73.3	1.965	82