

# GTO High Strength Tapping Bolt

**Challenge:** Until now grade 8.8~10.9 bolts could only be made from medium carbon (JIS SWCH45K) or alloy steel (JIS SCM435) which are higher priced and more difficult to cold form. High strength bolts with “tapping” capabilities simply did not exist.

**Solution:** GTO’s high strength bolts are made from a modified low carbon steel, SWCH10CR\*<sup>1</sup>, that can be through-hardened to achieve grade 8.8 ~ 10.9 properties or alternatively carburized to create a bolt capable of tapping into steel



## Merits:

- \* Lower cost
  - \* Grade 8.8 or 10.9 properties when through hardened depending upon size
- Available Sizes:
- Grade 8.8 : M8~M12
  - Grade 10.2: M8~M10
- \* Tapping capabilities when carburizing heat treatment is applied.  
Surface hardness is Hv 600~700 while core hardness is maintained at a relatively low HRC 34~35.
  - \* Fine grain structure minimizes risk of delayed fractures.
  - \* Material is less susceptible to rust after plating because of its chromium contents.

\*<sup>1</sup> SWCH10CR is a product of G.T.O. Co., Ltd.



# Technical Information

## Chemistry

(% wt)

Grade	C	Si	Mn	P	S	Cr	Mo.	Other
SWCH10CR	≤ 0.20	≤ 0.10	≤ 2.0	≤ 0.015	≤ 0.015	≤ 1.00	-	Included
SWCH45K	0.42~0.48	0.10~0.35	0.60~0.90	≤ 0.030	≤ 0.035	-	-	None
SCM435	0.33~0.38	0.15~0.35	0.60~0.85	≤ 0.030	≤ 0.035	0.90~1.20	0.15~0.30	None

## Material Characteristics

Grade	T/S (N/mm <sup>2</sup> ) (Max.)	RA (%) (Min.)	Hardness HRB (Min.)	Grain Size
SWCH10CR	600	60	83	# 11.5 (8μ)
SWCH45K	680	55	97	# 9.5 (16μ)
SCM435	680	55	97	# 9.5 (16μ)

## Mechanical Properties (Through Hardening)

Item	JIS Spec. (Min.)	Samples after Plating					
		1	2	3	4	5	6
Tensile Break Load (N)	20,900	22,700	22,400	22,540	22,460	22,480	22,460
Tensile Strength (N/mm <sup>2</sup> )	1,041 (150 ksi)	1,129	1,114	1,121	1,117	1,118	1,117
Yield Strength (N/mm <sup>2</sup> )	940 (136 ksi)	1,072	1,067	1,068	1,065	1,063	1,074
Elongation (%)	9.00	14.04	13.93	13.50	14.66	13.90	13.60
Core Hardness	HRC 32~36	HRC 33~36					



# Technical Information

## Mechanical Properties (Carburizing Heat Treatment)

Item	JIS Spec. (Min.)	Samples after Plating					
		1	2	3	4	5	6
Tensile Break Load (N)	20,900	21,860	22,060	21,940	22,140	22,320	22,000
Tensile Strength (N/mm <sup>2</sup> )	1,041 (150 ksi)	1,087	1,097	1,091	1,101	1,110	1,094
Yield Strength (N/mm <sup>2</sup> )	940 (136 ksi)	986	1,009	1,005	1,009	1,017	991
Elongation (%)	9.00	9.45	9.35	9.50	10.45	9.85	10.25
Surface Hardness	Hv 600~700	Hv 600~650					
Core Hardness	HRC 32~36	HRC 34~35					

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