

FIG.4-1. ALLOWABLE COLUMN STRESS FOR 1025 STEEL ROUND TUBING

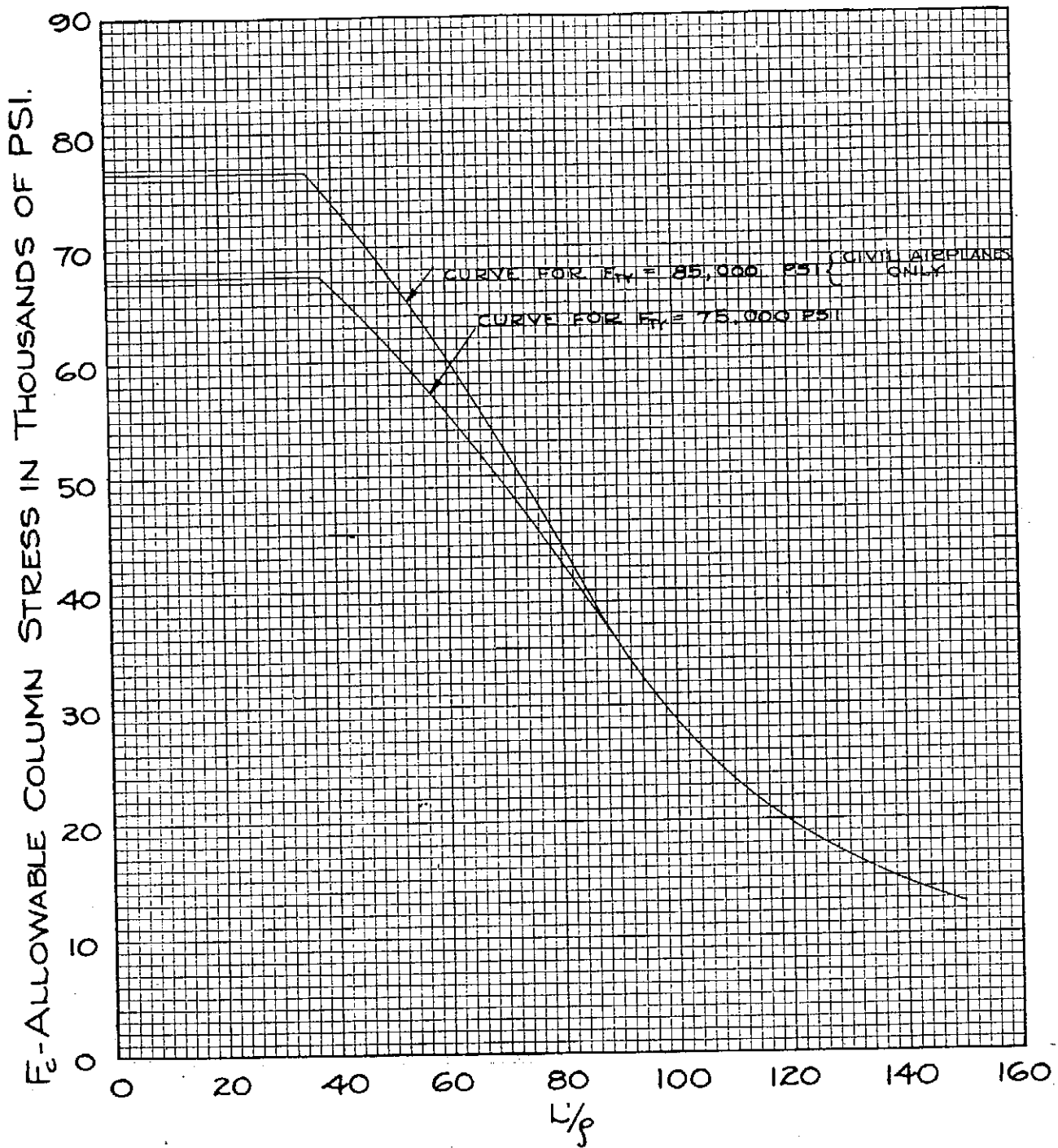


FIG. 4-2 ALLOWABLE COLUMN STRESS  
CHROME MOLYBDENUM ROUND TUBING

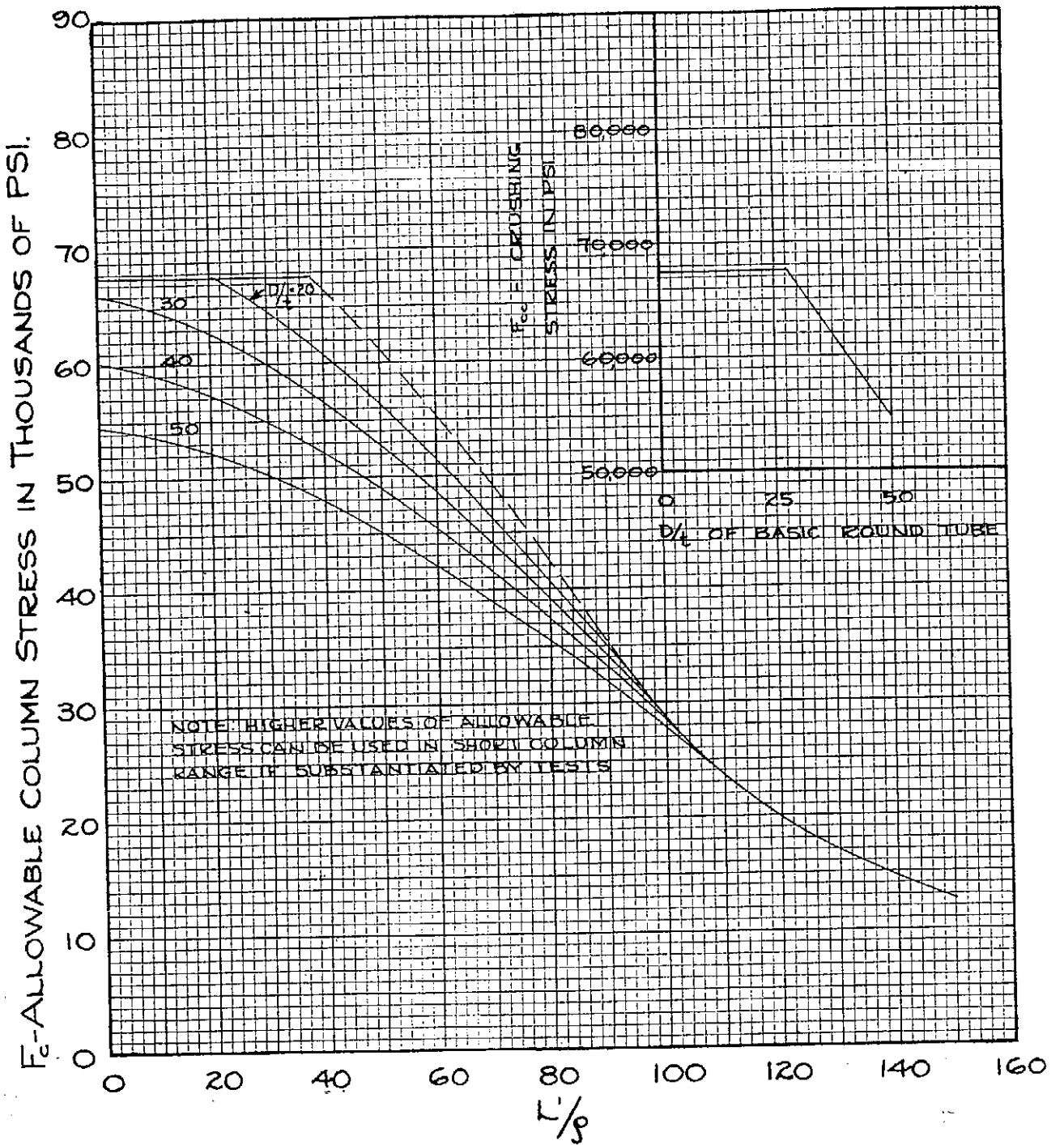


FIG. 4-3. ALLOWABLE COLUMN AND CRUSHING STRESSES CHROME MOLYBDENUM STREAMLINE TUBING  $F_{TY} = 75,000$  PSI.

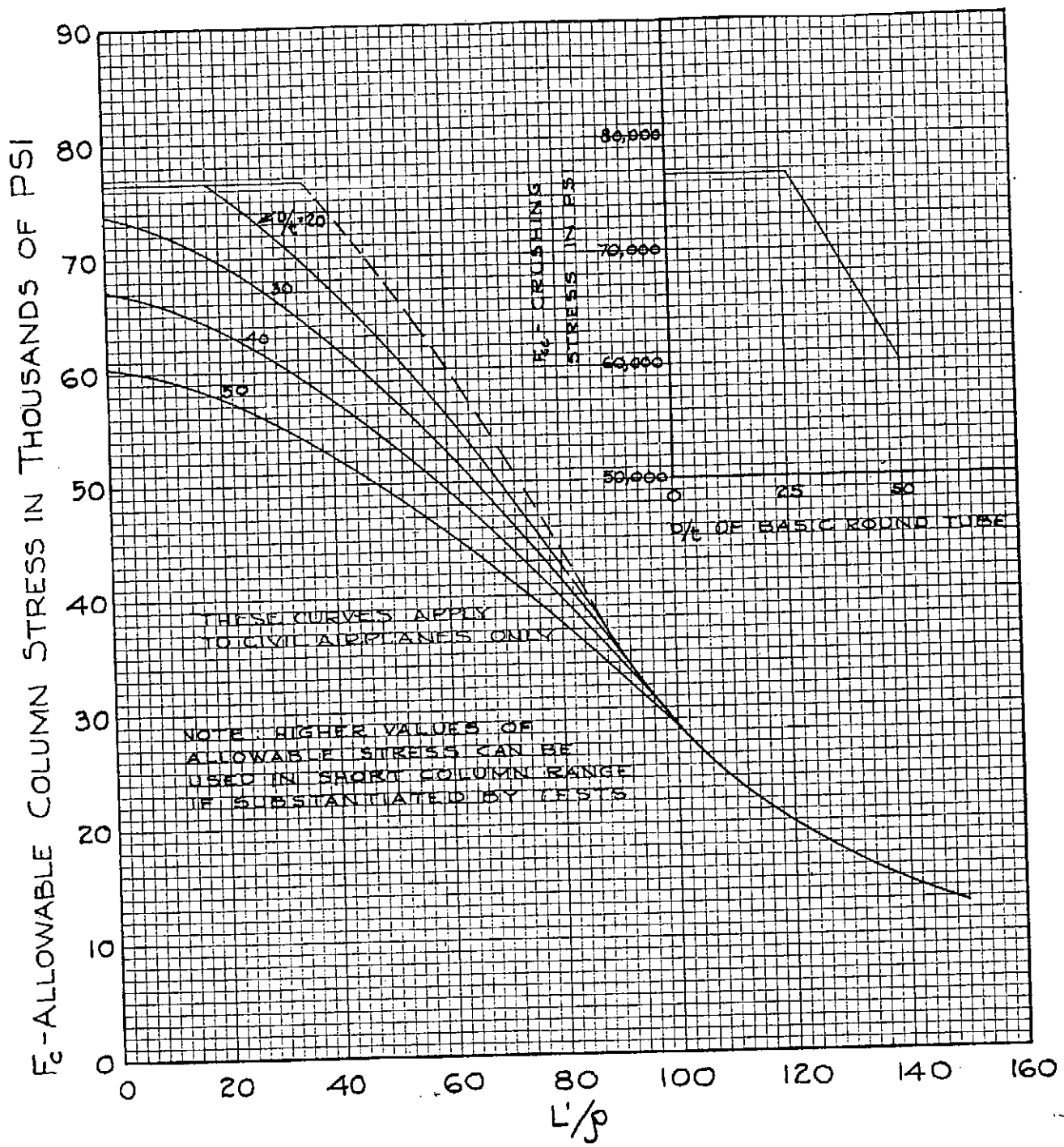


FIG. 4-4 ALLOWABLE COLUMN AND CRUSHING STRESSES CHROME MOLYBDENUM STREAMLINE TUBING  $F_{TY} = 85,000$  PSI.

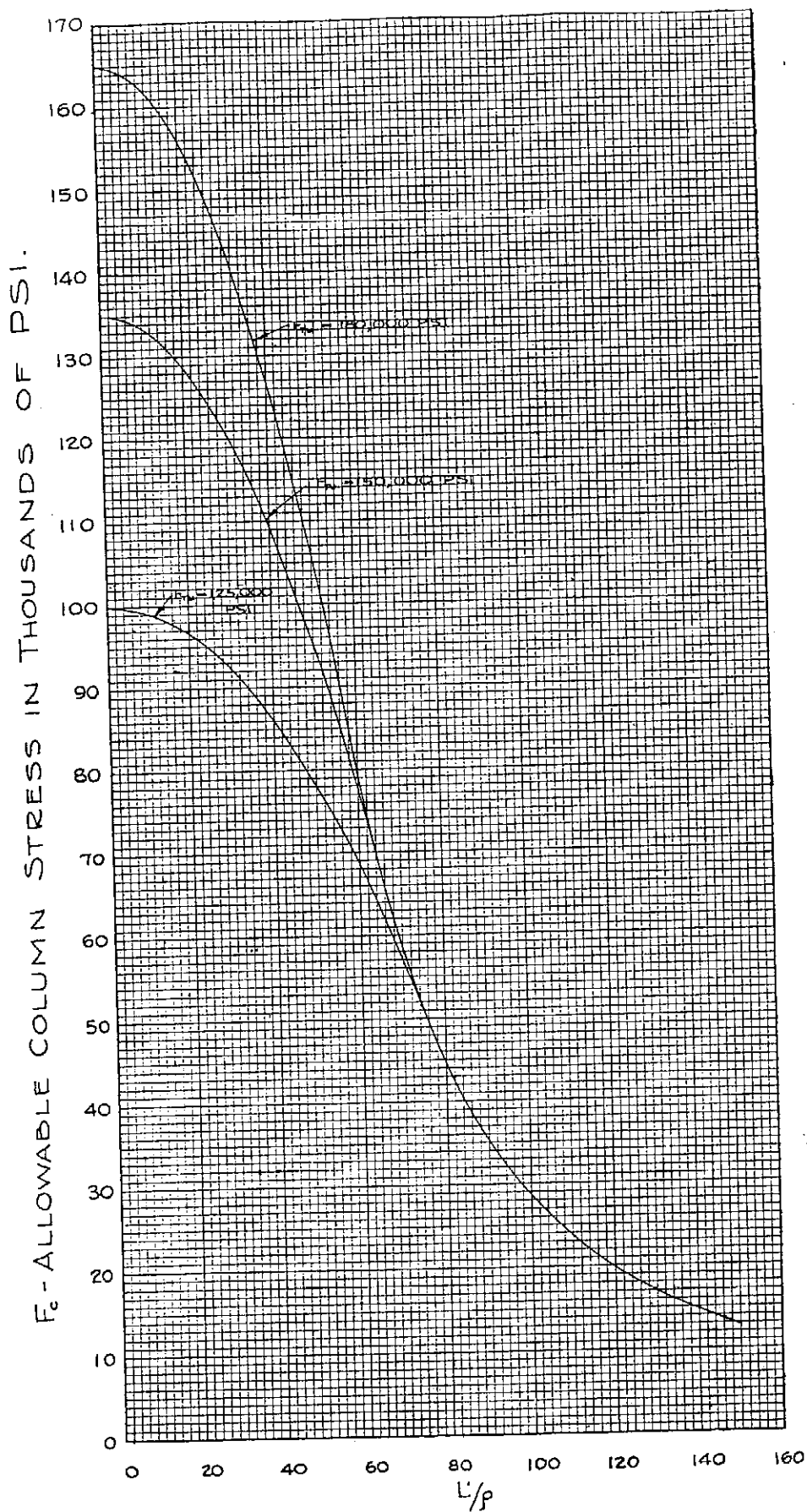


FIG. 4-5 ALLOWABLE COLUMN STRESS FOR HEAT-TREATED ALLOY STEEL ROUND TUBING

COLUMN STRENGTH - THOUSANDS OF POUNDS

C=2  
C=1

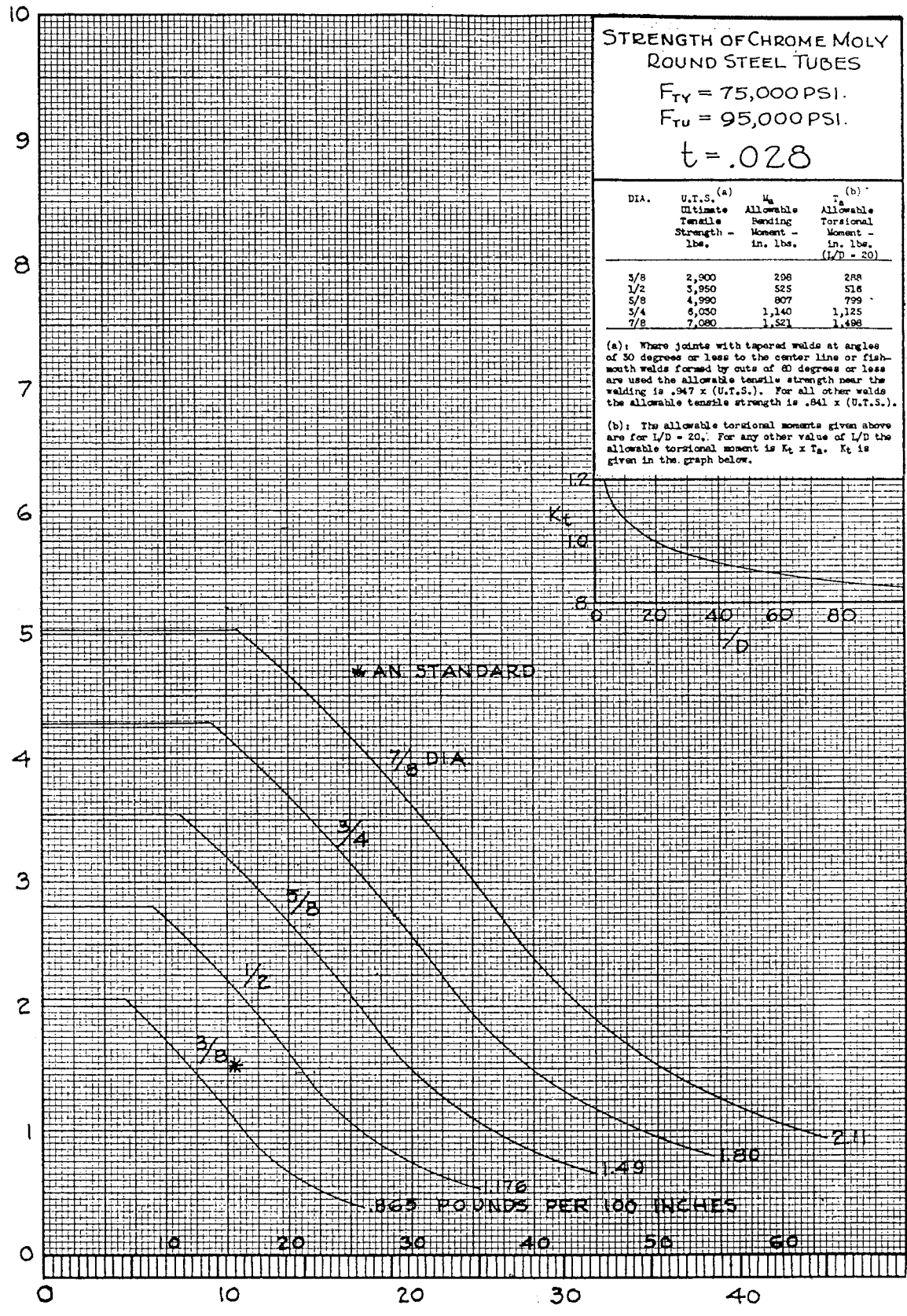


FIG. 4-6



COLUMN STRENGTH - THOUSANDS OF POUNDS

STRENGTH OF CHROME MOLY ROUND STEEL TUBES

$F_{TY} = 75,000 \text{ PSI.}$

$F_{TU} = 95,000 \text{ PSI.}$

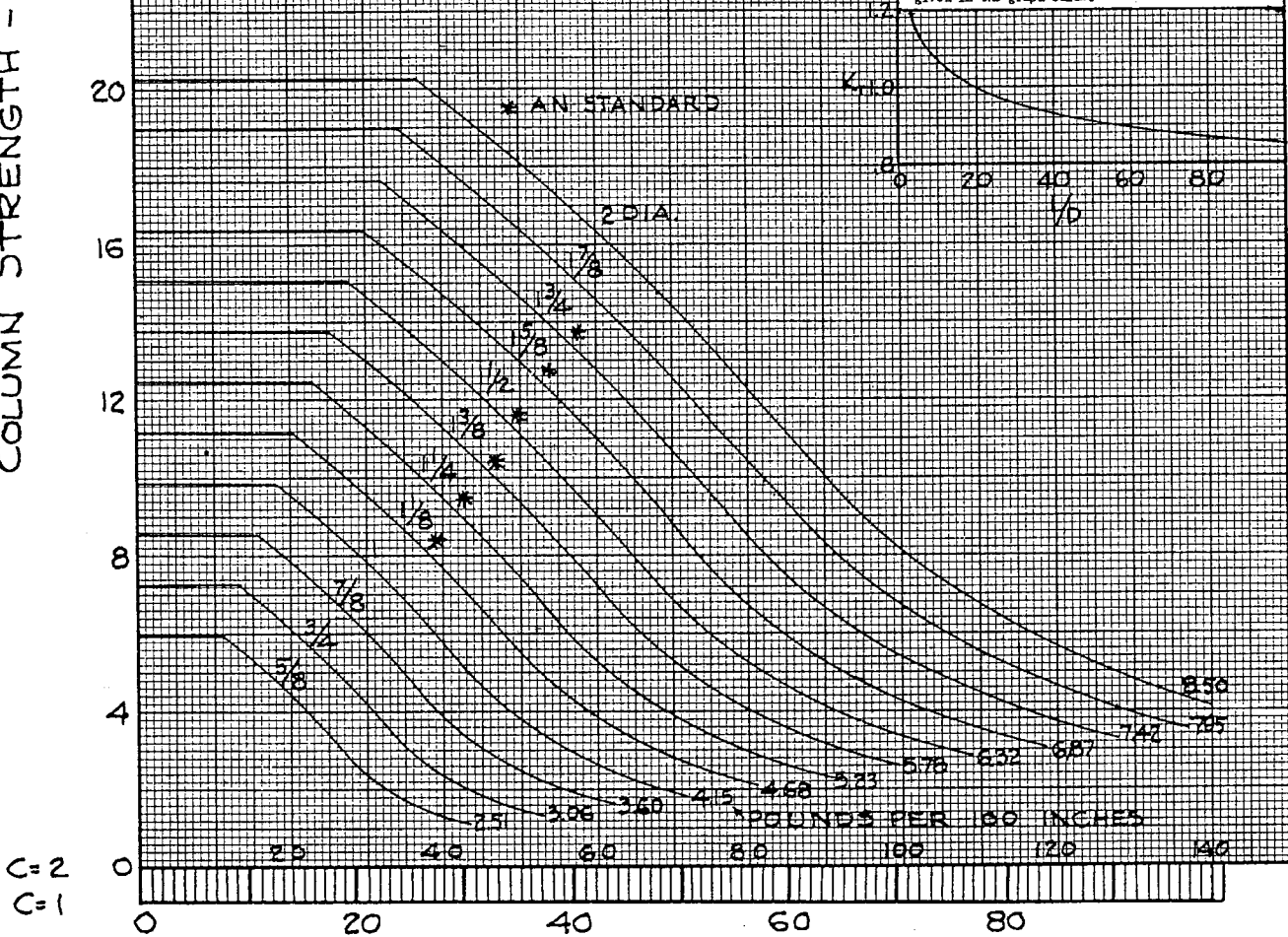
$t = .049$

(REVISED OCT 40)

DIA.	(a)		(b)	
	U.T.S. Ultimate Tensile Strength - lbs.	$K_t$ Allowable Bending Moment - in. lbs.	$T_a$ Allowable Torsional Moment - in. lbs. ( $L/D = 20$ )	
5/8	8,420	1,450	1,400	
3/4	10,250	2,080	2,055	
7/8	12,080	2,815	2,770	
1	15,910	3,650	3,530	
1 1/8	18,750	4,570	4,510	
1 1/4	17,580	5,570	5,500	
1 3/8	19,590	6,580	6,570	
1 1/2	21,220	7,580	7,740	
1 5/8	23,050	9,090	8,940	
1 3/4	24,870	10,430	10,180	
1 7/8	26,710	11,880	11,500	
2	28,530	13,370	12,810	

(a): Where joints with tapered welds at angles of 30 degrees or less to the center line or fish-mouth welds formed by cuts of 30 degrees or less are used the allowable tensile strength near the welding is .947 x (U.T.S.). For all other welds the allowable tensile strength is .841 x (U.T.S.).

(b): The allowable torsional moments given above are for  $L/D = 20$ . For any other value of  $L/D$  the allowable torsional moment is  $K_t \times T_a$ .  $K_t$  is given in the graph below.



C = 2  
C = 1

COLUMN LENGTH - INCHES

FIG. 4-8



COLUMN STRENGTH - THOUSANDS OF POUNDS

STRENGTH OF CHROME MOLY ROUND STEEL TUBES

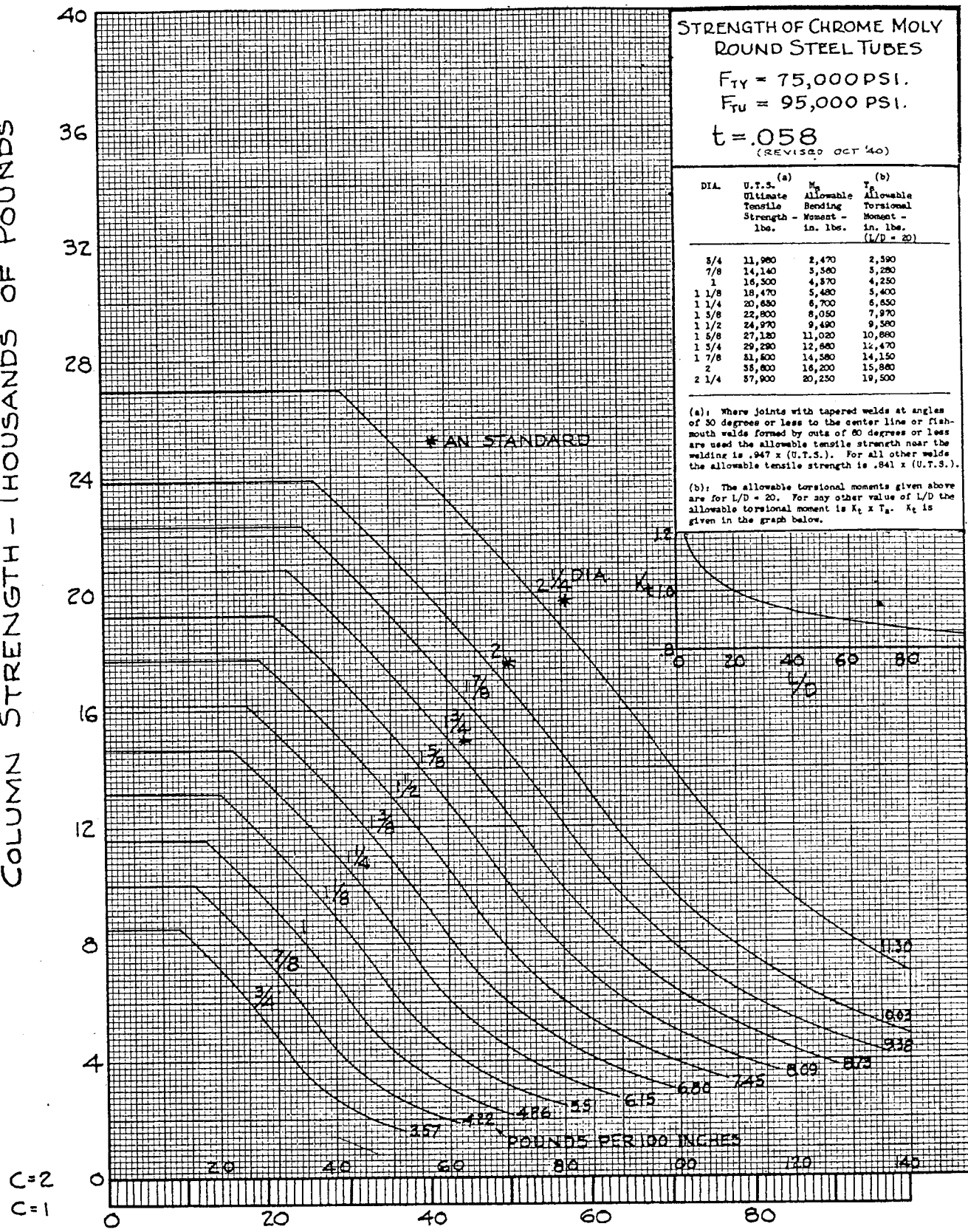
$F_{TY} = 75,000 \text{ PSI.}$   
 $F_{TU} = 95,000 \text{ PSI.}$

$t = .058$   
 (REVISED OCT '40)

DIA.	(a)		(b)	
	U.T.S. Ultimate Strength - lbs.	$M_b$ Allowable Bending Moment - in. lbs.	$T_a$ Allowable Torsional Moment - in. lbs. (L/D = 20)	
3/4	11,980	2,470	2,590	
7/8	14,140	3,560	3,280	
1	16,500	4,370	4,250	
1 1/8	18,470	5,450	5,400	
1 1/4	20,850	6,700	6,550	
1 5/8	22,800	8,050	7,970	
1 1/2	24,970	9,490	9,560	
1 5/8	27,180	11,020	10,860	
1 3/4	29,290	12,660	12,470	
1 7/8	31,600	14,580	14,150	
2	35,000	16,200	15,860	
2 1/4	37,900	20,250	19,500	

(a) Where joints with tapered welds at angles of 30 degrees or less to the center line or fish-mouth welds formed by cuts of 80 degrees or less are used the allowable tensile strength near the weldline is .947 x (U.T.S.). For all other welds the allowable tensile strength is .841 x (U.T.S.).

(b) The allowable torsional moments given above are for L/D = 20. For any other value of L/D the allowable torsional moment is  $K_t \times T_a$ .  $K_t$  is given in the graph below.



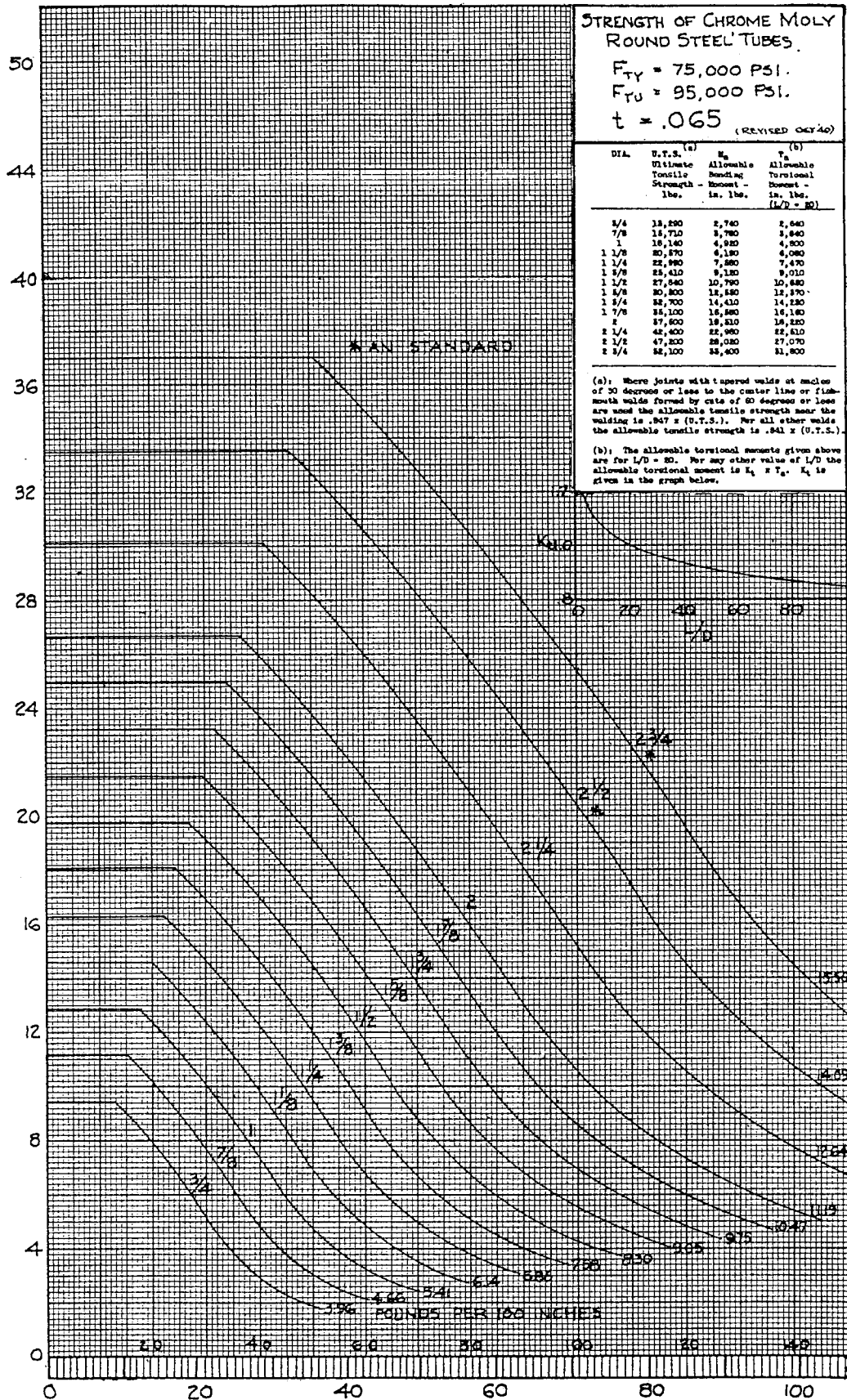
C=2  
C=1

COLUMN LENGTH - INCHES

FIG. 4-9

COLUMN STRENGTH - THOUSANDS OF POUNDS

C=2  
C=1



COLUMN LENGTH - INCHES

FIG. 4-10

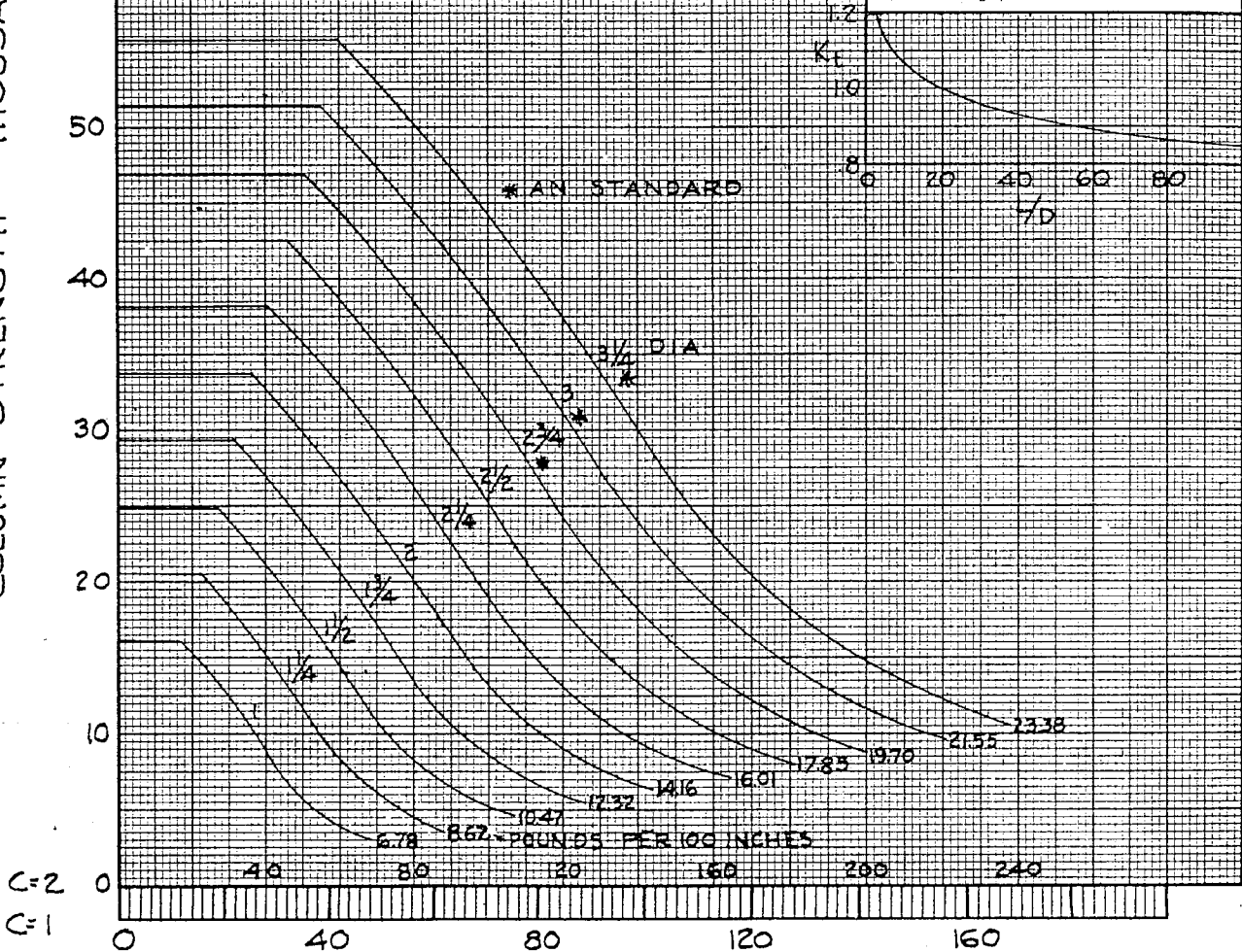
COLUMN STRENGTH - THOUSANDS OF POUNDS

STRENGTH OF CHROME MOLY  
 ROUND STEEL TUBES  
 $F_{TY} = 75,000$  PSI.  
 $F_{Tu} = 95,000$  PSI.  
 $t = .083$   
 (REVISED OCT '40)

DIA.	U.T.S. (a) Ultimate Tensile Strength - lbs.	$K_p$ Allowable Bending Moment - in. lbs.	$T_a$ (b) Allowable Torsional Moment - in. lbs. (L/D = 20)
1	22,720	6,200	5,950
1 1/4	28,910	9,830	9,500
1 1/2	35,100	14,020	13,770
1 3/4	41,500	18,900	18,640
2	47,500	24,570	24,050
2 1/4	53,700	30,400	30,000
2 1/2	59,900	37,000	36,400
2 3/4	66,100	44,100	43,500
3	72,500	51,800	50,800
3 1/4	78,400	60,200	58,200

(a): Where joints with tapered welds at an angle of 30 degrees or less to the center line or fish-mouth welds formed by cuts of 60 degrees or less are used the allowable tensile strength near the welding is  $.947 \times$  (U.T.S.). For all other welds the allowable tensile strength is  $.841 \times$  (U.T.S.).

(b): The allowable torsional moments given above are for L/D = 20. For any other value of L/D the allowable torsional moment is  $I_t \times T_a$ .  $I_t$  is given in the graph below.



COLUMN LENGTH - INCHES

FIG. 4-11

STRENGTH OF CHROME MOLY  
 ROUND STEEL TUBES  
 $F_{TY} = 75,000 \text{ PSI}$   
 $F_{TU} = 95,000 \text{ PSI}$   
 $t = .095$   
 (REVISED OCT '40)

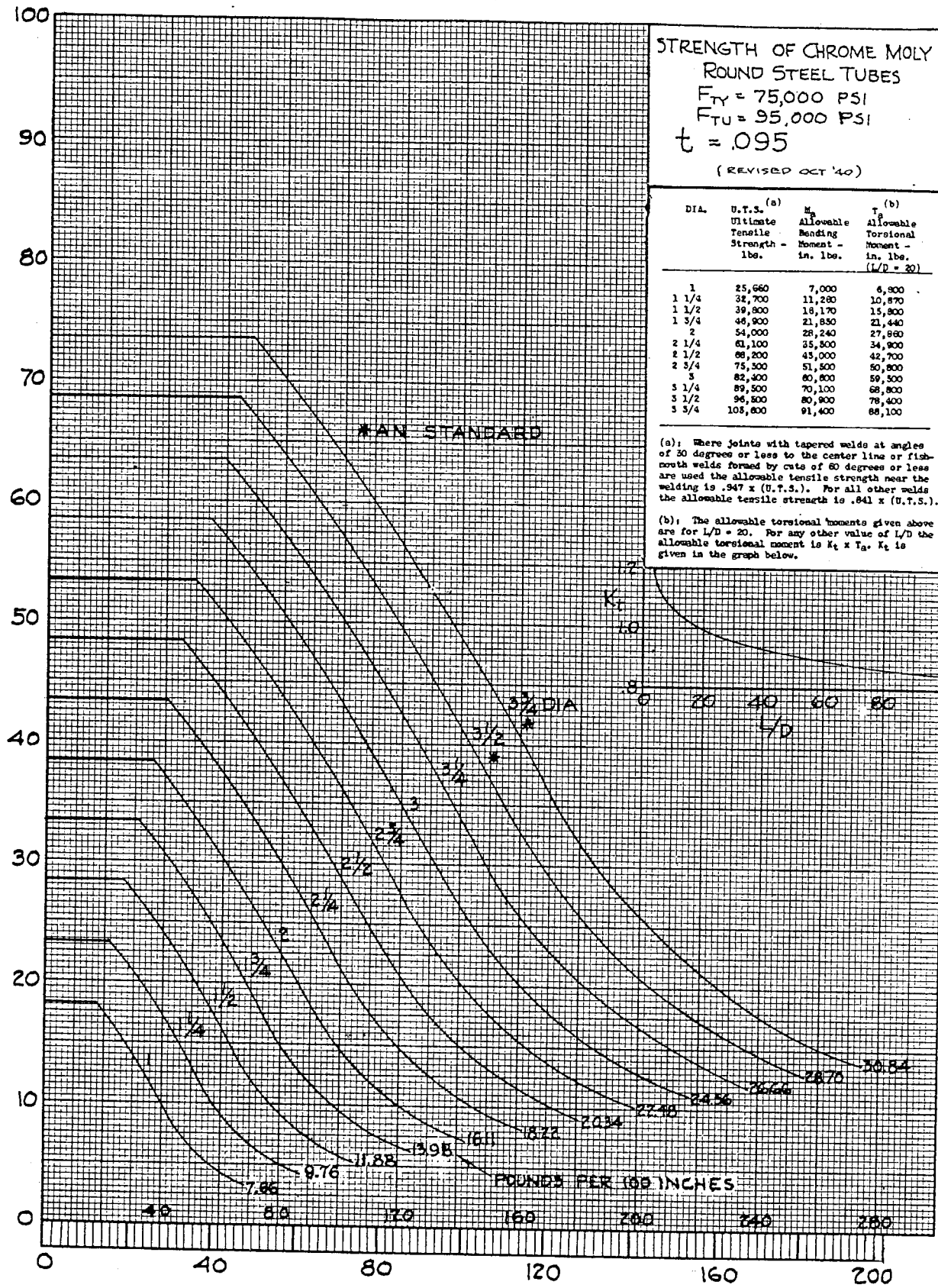
DIA.	U.T.S. (a) Ultimate Tensile Strength - lbs.	$M_b$ Allowable Bending Moment - in. lbs.	$T$ (b) Allowable Torsional Moment - in. lbs. (L/D = 20)
1	25,660	7,000	6,900
1 1/4	32,700	11,280	10,870
1 1/2	39,800	18,170	15,800
1 3/4	46,900	21,850	21,440
2	54,000	28,240	27,880
2 1/4	61,100	35,800	34,900
2 1/2	68,200	43,000	42,700
2 3/4	75,300	51,500	50,800
3	82,400	60,800	59,500
3 1/4	89,500	70,100	68,800
3 1/2	96,600	80,900	78,400
3 3/4	103,800	91,400	88,100

(a): Where joints with tapered welds at angles of 30 degrees or less to the center line or fish-mouth welds formed by cuts of 80 degrees or less are used the allowable tensile strength near the welding is .947 x (U.T.S.). For all other welds the allowable tensile strength is .841 x (U.T.S.).

(b): The allowable torsional moments given above are for L/D = 20. For any other value of L/D the allowable torsional moment is  $K_t \times T_a$ .  $K_t$  is given in the graph below.

COLUMN STRENGTH - THOUSANDS OF POUNDS

C=2  
C=1



COLUMN LENGTH - INCHES

FIG. 4-12