OPERATOR'S MANUAL

NORBAR JOINT SIMULATION RUNDOWN FIXTURES

Part Number 34290 | Issue 2 | Original Instructions (English)

CONTENTS

PART NUMBERS COVERED BY THIS MANUAL

Part Number	Description	Square Drive
50313	0.2 - 2 N·m (2 - 25 lbf·in) for use with Bench Stands	¼”
50251	2 - 10 N·m (20 - 100 lbf·in) for use with Bench Stands	¼”
50252	5 - 50 N·m (5 - 50 lbf·ft) for use with Bench Stands	⅜”
50253	10 - 100 N·m (10 - 100 lbf·ft) for use with Bench Stands	½”
50254	100 - 700 N·m (100 - 500 lbf·ft) for use with Bench Stands	¾”
50693	10 – 140 N·m (10 – 100 lbf·ft) for use with STB1000	½”
50694	100 – 700 N·m (70 – 500 lbf·ft) for use with STB1000	¾”

INTRODUCTION

The Norbar Joint Simulator in conjunction with the Norbar Torque Transducers and instruments is designed to measure the torque output of power torque tools. This it does by simulating the working conditions of screwed or bolted joints.

Spring Washers can be arranged in various serial/parallel combinations to represent the working conditions as seen by the tool, ie. joints of varying stiffness ('soft' or 'hard' pull up) and for a range of maximum torque outputs.

Refer to BS 6268, ISO 6544 and ISO 5393 for further details on torque tool rundown.

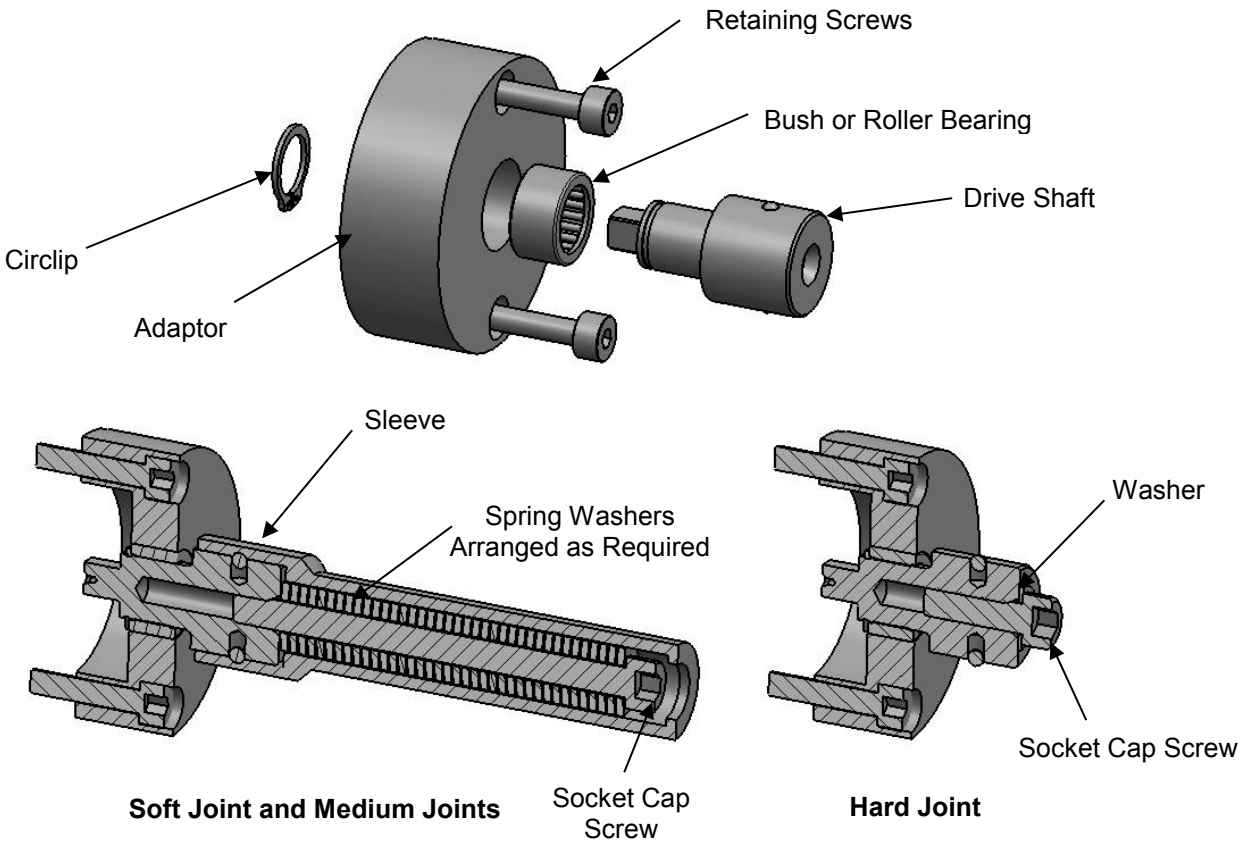
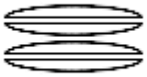


FIGURE 1 – Exploded View of Fixture Assembly

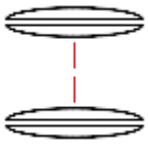
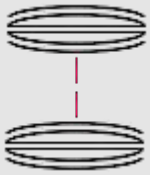
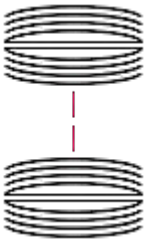
PART NUMBER 50313 (0.2 – 2 N·m, 2 – 25 lbf·in)

Washer arrangements for joint simulation

 Washers in Series

 Washers in Parallel

Washer Make Up For Various Joint Conditions

Washer Make Up		Torque Range
	72 Washers in series (STACK A)	0.2 - 0.7 N·m (1.8 - 6 lbf·in)
	40 Stacks of 2 washers in parallel, in series (STACK B)	0.5 - 1.4 N·m (4.5 - 12.5 lbf·in)
	20 Stacks of 4 washers in parallel, in series (STACK C)	1.2 - 2.8 N·m (10 - 25 lbf·in)

NOTE: Exceeding maximum torque for washer make-up will result in permanent damage to washers.

Keep bolt and washers greased with a graphite loaded grease.

Supplied with washer stack 'C'. Other stacks can be made up by rearranging stack 'C'.

For a 'hard' pull up condition, remove sleeve, long bolt and all spring washers and run down the short bolt and plain washers supplied.

Operation Procedure

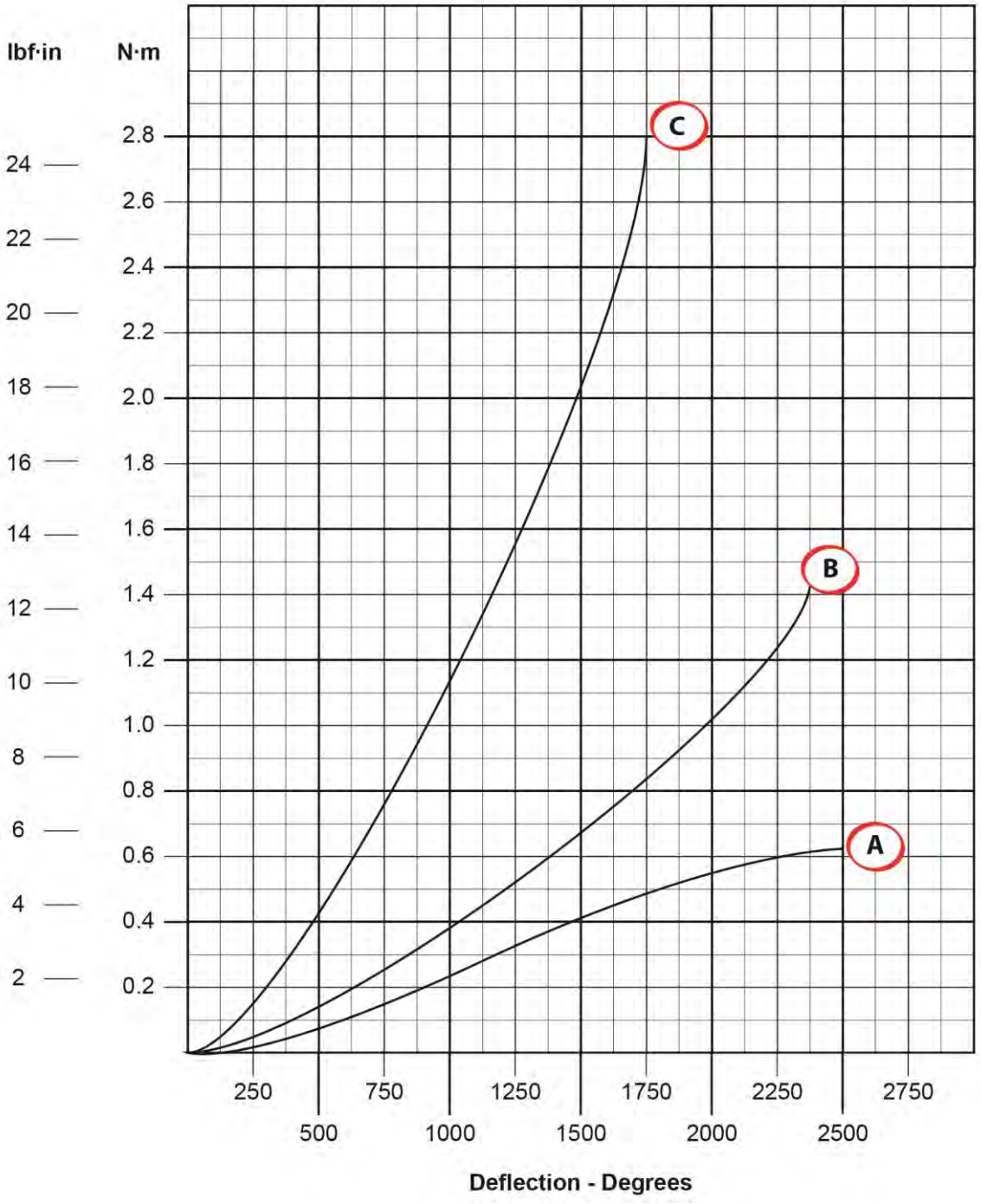
Switch display instrument to required mode (see instrument operators manual for details).
With selected arrangement of spring washers in fixture, run bolt down with tool and note torque output.
Reverse tool to undo bolt ready for next test. Reset readout on display instrument as required.

Graph Showing Torque Rate Curves For Various Washer Make-Ups

Bolt Size: M6 x 80mm x 1.0 pitch, 12.9 socket cap screw, 5mm A/F

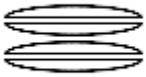
Washers: DIN 2093 - A12.5 (12.5mm x 6.2mm x 0.7mm)

Lubrication: Rocol M204 G Graphite grease or Rocol Tufgear 85.



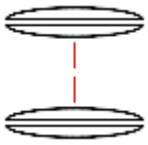
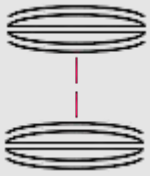
PART NUMBER 50251 (2 - 10 N·m, 20 – 100 lbf·in)

Washer arrangements for joint simulation

 Washers in Series

 Washers in Parallel

Washer Make Up For Various Joint Conditions

Washer Make Up		Torque Range
	40 Washers in series (STACK D)	2 - 6 N·m (20 - 50 lbf·in)
	21 Stacks of 2 washers in parallel, in series (STACK E)	6 - 12 N·m (50 - 100 lbf·in)

NOTE: Exceeding maximum torque for washer make-up will result in permanent damage to washers.

Keep bolt and washers greased with a graphite loaded grease.

Supplied with washer stack 'E'. Other stacks can be made up by rearranging stack 'E'.

For a 'hard' pull up condition, remove sleeve, long bolt and all spring washers and run down the short bolt and plain washers supplied.

Operation Procedure

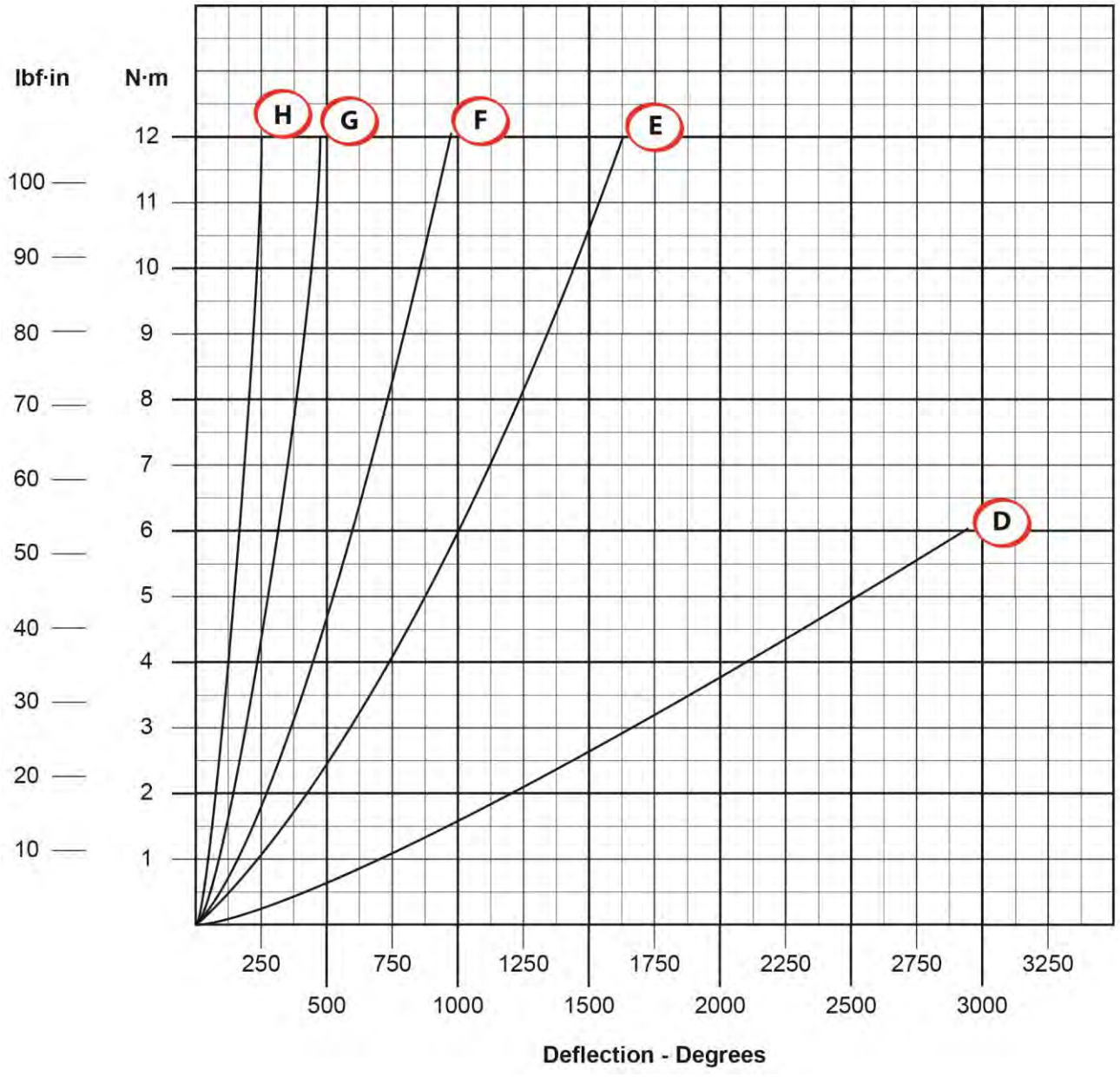
Switch display instrument to required mode (see instrument operators manual for details).
With selected arrangement of spring washers in fixture, run bolt down with tool and note torque output.
Reverse tool to undo bolt ready for next test. Reset readout on display instrument as required.

Graph Showing Torque Rate Curves For Various Washer Make-Ups

Bolt Size: M6 x 1.00 Pitch, 12.9 socket cap screw

Washers: DIN 6796-6-FST (14mm x 6.4mm x 1.5mm)

Lubrication: Rocol M204 G Graphite Grease or Rocol Tufgear 85.



‘D’ 40 washers in series

‘E’ 21 stacks of 2 washers in parallel, in series

‘F’ 14 stacks of 3 washers in parallel, in series

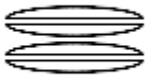
‘G’ 7 stacks of 6 washers in parrallel, in series

‘H’ 42 washers in parallel

NOTE: Washer make-ups ‘D’ and ‘E’ only for soft joint condition.
‘F’, ‘G’ and ‘H’ for intermediate joint condition.

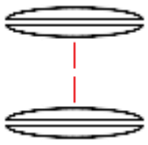
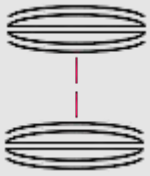
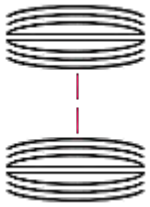
PART NUMBER 50252 (5 – 50 N·m, 5 – 50 lbf·ft)

Washer arrangements for joint simulation

 Washers in Series

 Washers in Parallel

Washer Make Up For Various Joint Conditions

Washer Make Up		Torque Range
	36 Washers in series (STACK A)	5 - 30 N·m (5 - 20 lbf·ft)
	18 Stacks of 2 washers in parallel, in series (STACK B)	20 - 50 N·m (15 - 35 lbf·ft)
	12 Stacks of 3 washers in parallel, in series (STACK C)	50 - 70 N·m (35 - 50 lbf·ft)

NOTE: Exceeding maximum torque for washer make up will result in permanent damage to washers.

Keep bolt and washers greased with a graphite loaded grease.

Supplied with washer stack 'C'. Other stacks can be made up by rearranging stack 'C'.

For a 'hard' pull up condition, remove sleeve, long bolt and all spring washers and run down the short bolt and plain washers supplied.

Operation Procedure

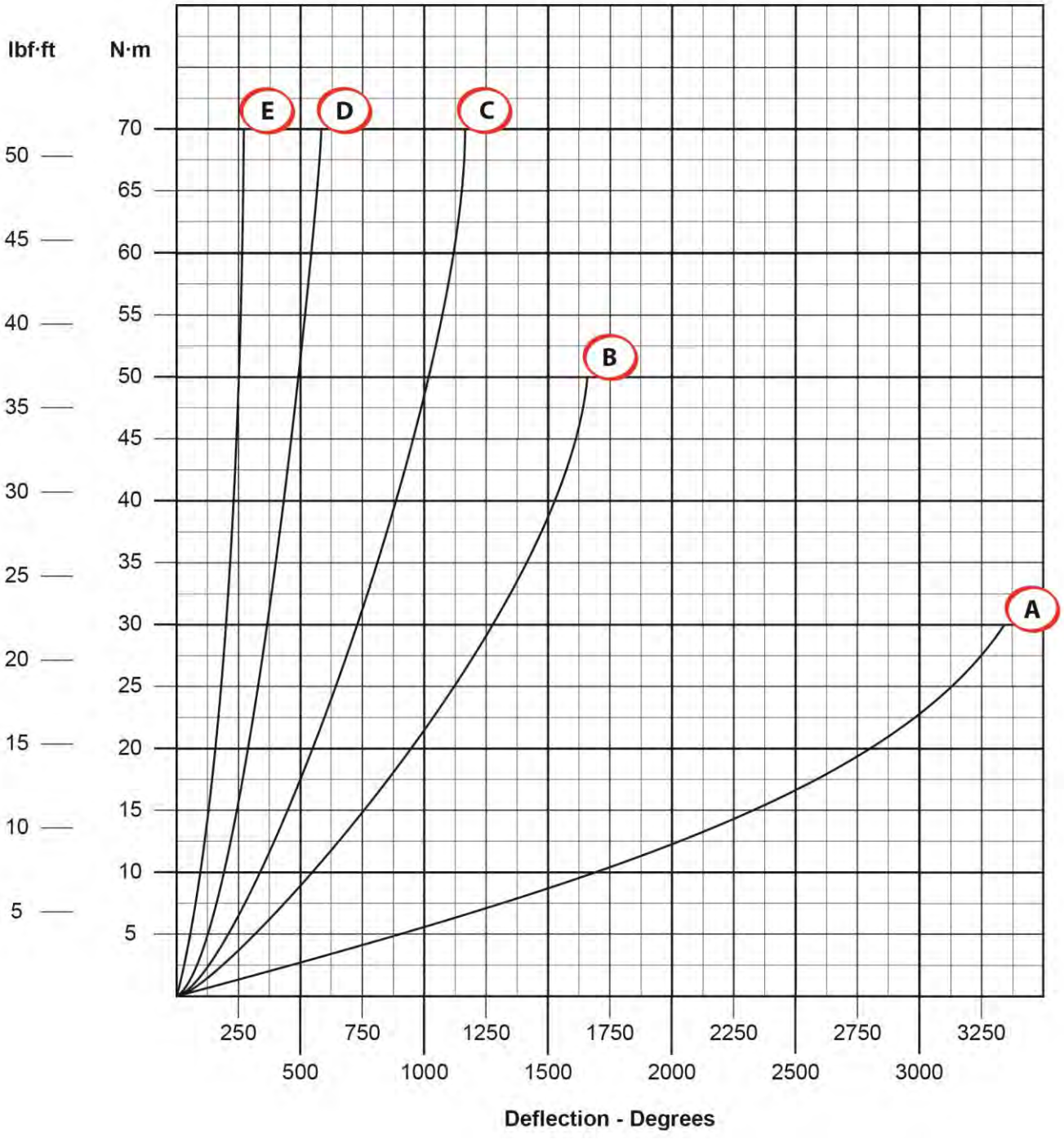
Switch display instrument to required mode (see instrument operators manual for details).
With selected arrangement of spring washers in fixture, run bolt down with tool and note torque output.
Reverse tool to undo bolt ready for next test. Reset readout on display instrument as required.

Graph Showing Torque Rate Curves For Various Washer Make-Ups

Bolt Size: M10 x 1.25 pitch, 12.9 socket cap screw.

Washers: DIN 6796-10-FST (23mm x 10.5mm x 2.5mm)

Lubrication: Rocol M204 G Graphite grease or Rocol Tufgear 85.



'A' 36 washers in series

'B' 18 stacks of 2 washers in parallel, in series

'C' 12 stacks of 3 washers in parallel, in series

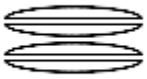
'D' 6 stacks of 6 washers in parallel, in series

'E' 36 washers in parallel

NOTE: Washer make-ups 'A', 'B' and 'C' only for soft joint condition. 'D', 'E' for intermediate joint condition.

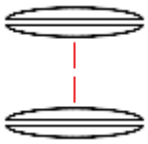
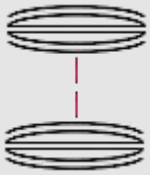
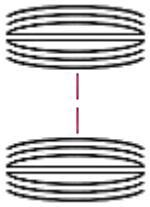
PART NUMBER 50253 & 50693 (10 - 140 N·m, 10 – 100 lbf·ft)

Washer arrangements for joint simulation

 Washers in Series

 Washers in Parallel

Washer Make Up For Various Joint Conditions

Washer Make Up		Torque Range
	28 Washers in series (STACK F)	10 - 50 N·m (10 - 35 lbf·ft)
	15 Stacks of 2 washers in parallel, in series (STACK G)	30 - 100 N·m (25 - 70 lbf·ft)
	10 Stacks of 3 washers in parallel, in series (STACK H)	80 – 140 N·m (60 - 100 lbf·ft)

NOTE: Exceeding maximum torque for washer make up will result in permanent damage to washers.

Keep bolt and washers greased with a graphite loaded grease.

50253 and 50693 are supplied with washer stack 'H'. Other stacks can be made up by rearranging stack 'H'.

For a 'hard' pull up condition, remove sleeve, long bolt and all spring washers and run down the short bolt and plain washers supplied

Operation Procedure

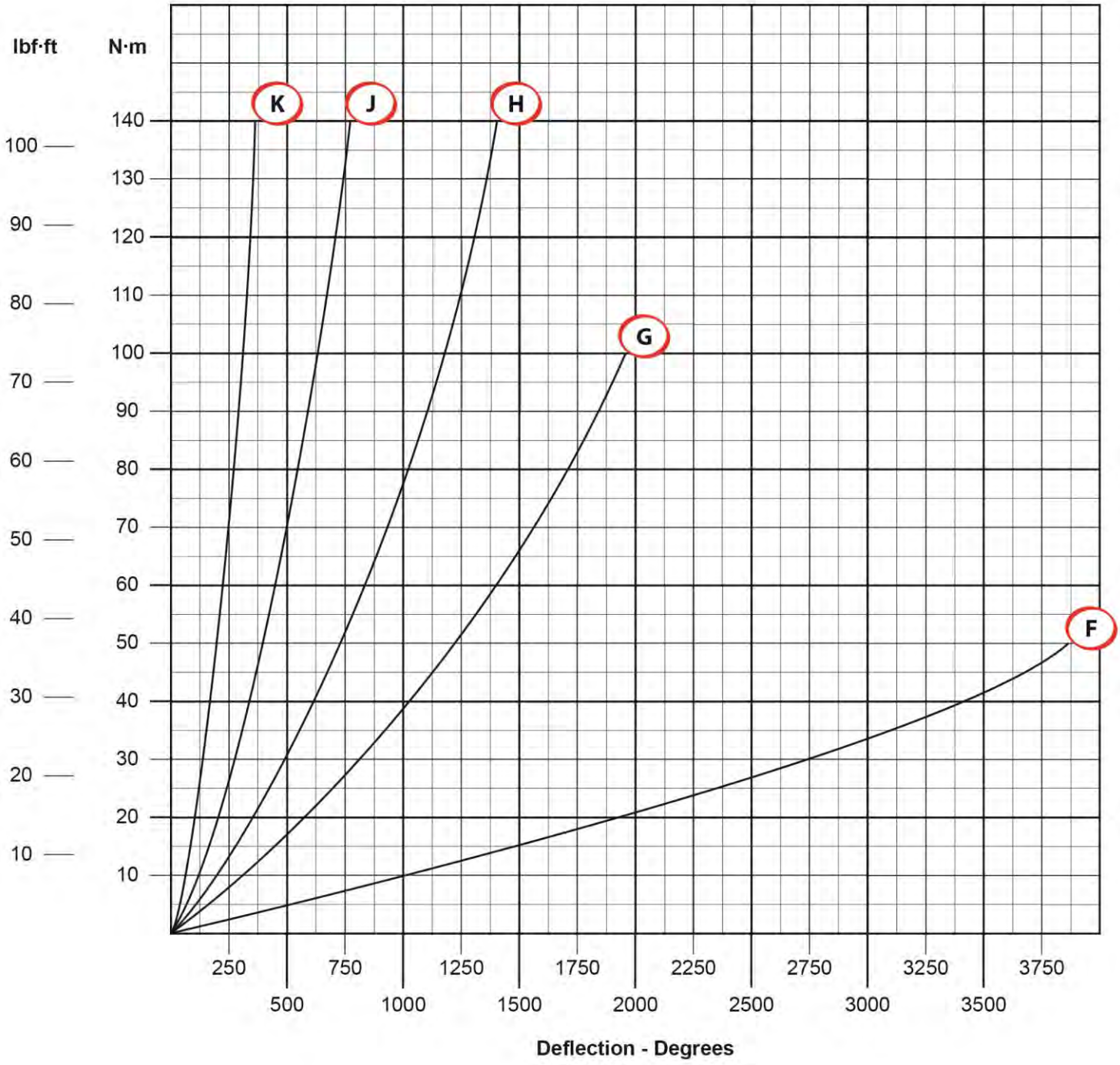
Switch display instrument to required mode (see instrument operators manual for details).
With selected arrangement of spring washers in fixture, run bolt down with tool and note torque output.
Reverse tool to undo bolt ready for next test. Reset readout on display instrument as required.

Graph Showing Torque Rate Curves For Various Washer Make-Ups

Bolt Size: M12 x 1.25 pitch, 12.9 socket cap screw.

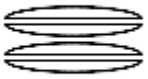
Washers: DIN 6786-12-FST (29mm x 13mm x 3mm)

Lubrication: Rocol M204 G Graphite grease or Rocol Tufgear 85.



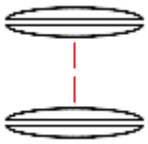
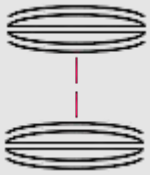
PART NUMBER 50254 50694 (100 - 700 N·m, 100 – 500 lbf·ft)

Washer arrangements for joint simulation

 Washers in Series

 Washers in Parallel

Washer Make Up For Various Joint Conditions

Washer Make Up		Torque Range
	30 Washers in series (STACK A)	100 - 400 N·m (100 - 300 lbf·ft)
	15 Stacks of 2 washers in parallel, in series (STACK B)	350 - 700 N·m (250 - 500 lbf·ft)

NOTE: Exceeding maximum torque for washer make-up will result in permanent damage to washers.

Keep bolt and washers greased with a graphite loaded grease.

50254 and 50694 are supplied with washer stack 'B'. Other stacks can be made up by rearranging stack 'B'.

For a 'hard' pull up condition, remove sleeve, long bolt and all spring washers and run down the short bolt and plain washers supplied.

Operation Procedure

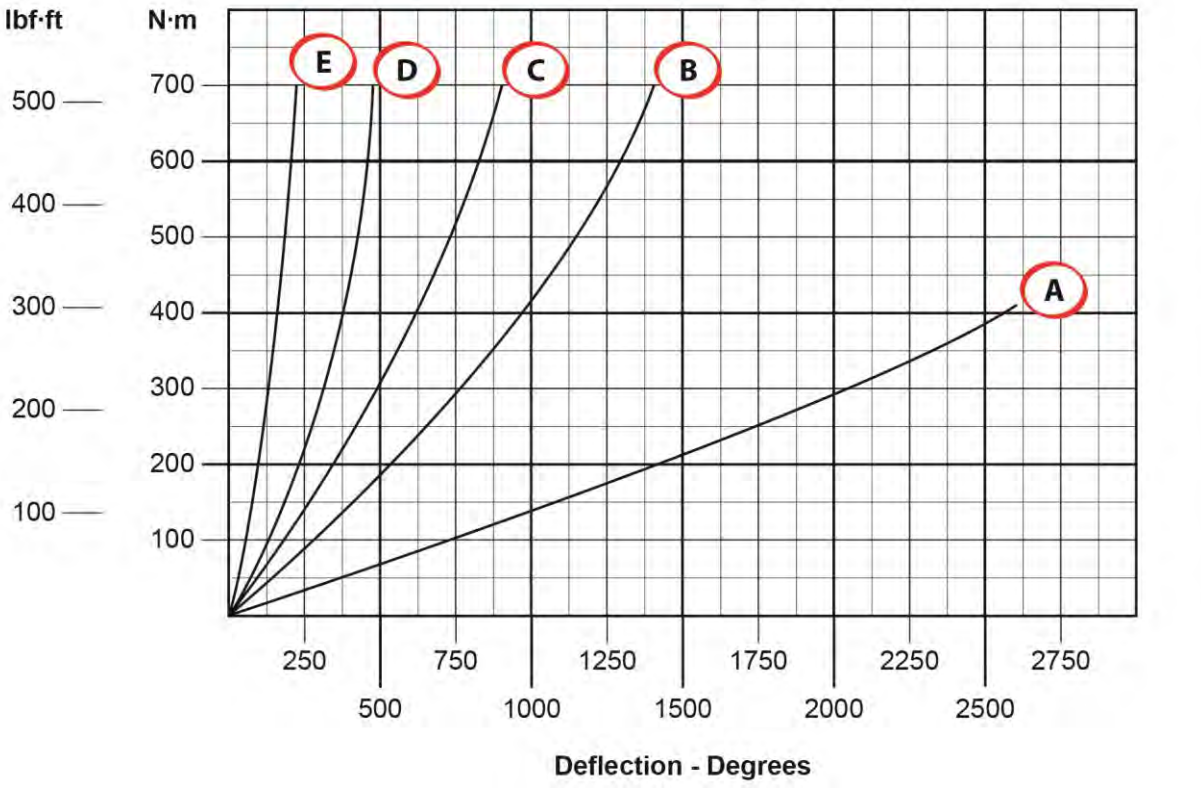
Switch display instrument to required mode (see instrument operators manual for details).
With selected arrangement of spring washers in fixture, run bolt down with tool and note torque output.
Reverse tool to undo bolt ready for next test. Reset readout on display instrument as required.

Graph Showing Torque Rate Curves For Various Washer Make-Ups

Bolt Size: M24 x 240mm long x 3mm pitch, 12.9 socket cap screw, 19mm A/F.

Washers: DIN 6796-24-FST (56mm x 25mm x 6mm).

Lubrication: Rocol M204 G Graphite grease or Rocol Tufgear 85.



'A' 30 washers in series

'B' 15 stacks of 2 washers in parallel, in series

'C' 10 stacks of 3 washers in parallel, in series

'D' 6 stacks of 5 washers in parallel, in series

'E' 30 washers in parallel

NOTE: Washer make-ups 'A' and 'B' only for soft joint condition. 'C', 'D' and 'E' for intermediate joint condition.

BOLT AND HEX DRIVE SIZES

Part Number	Bolt Size	Hex Drive
50313	M6 x 1.0	5mm AF
50251	M6 x 1.0	5mm AF
50252	M10 x 1.0	8mm AF
50253, 50693	M12 x 1.25	10mm AF
50254, 50694	M24 x 3.0	19mm AF

SPARE WASHER STACKS

Part Number	Capacity	For Use With Joint Simulator
50175 (Washer Stack A)	0.2 – 0.7 N·m	50313
50176 (Washer Stack B)	0.5 – 1.4 N·m	50313
50177 (Washer Stack C)	1.2 – 2.8 N·m	50313
50178 (Washer Stack D)	2 – 6 N·m	50251
50179 (Washer Stack E)	6 – 12 N·m	50251
50695 (Washer Stack A)	5 – 30 N·m	50252
50696 (Washer Stack B)	20 – 50 N·m	50252
50697 (Washer Stack C)	50 – 70 N·m	50252
50180 (Washer Stack F)	10 – 50 N·m	50253, 50693
50192 (Washer Stack G)	30 – 100 N·m	50253, 50693
50698 (Washer Stack H)	80 – 140 N·m	50253, 50693

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