

# Sash Balance Installation

## Type D4 and D6 - Standard

## Type AL - Assisted Lift



It is recommended that the sashes are glazed and painted to ensure both sashes slide freely in the frame.

### Preparation of Windows

- Grooves to house balances can be in either frame jambs or in sash stiles, rounded or square and must be of minimum dimensions shown (Figs 1 & 2).

Bottom of sashes should be prepared to suit balance foot attachment to be used. Cut-outs should be sufficient depth to receive attachments and screw heads.

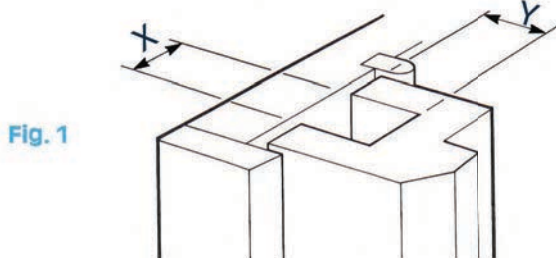


Fig. 1

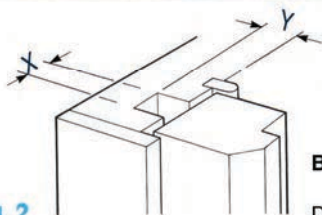


Fig. 2

Dimensions		
Balance Type	X	Y
D4-D6	17mm	17mm
AL20 AL30	18mm	18mm
AL40-60	20mm	20mm
AL70-AL90	22mm	22mm

Fig. 3 Bottom rail preparation for standard foot.

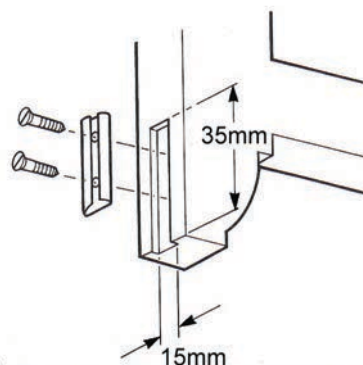
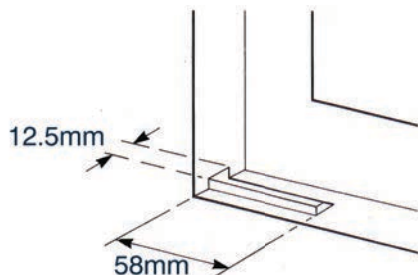


Fig. 4 Stile preparation for channel fitting.

Fig. 5 Bottom rail preparation for standard foot - Grooved stile.

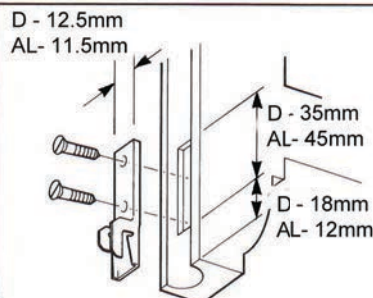
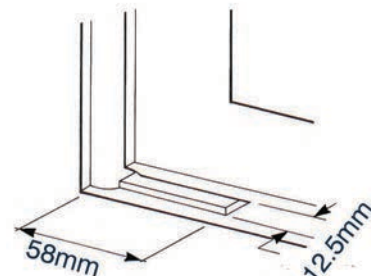


Fig. 6 Grooved stile preparation (fix foot attachment prior to fitting sash into frame)

### Checking balances

- It is important that the balances used are suitable for the weight of the sash. They are manufactured in weight groups that are identified by a colour. (See Fig. 7).

#### Colour Identification

D4	RED
D6	YELLOW
AL10	WHITE
AL20	RED
AL30	BLUE
AL40	BLACK
AL50	WHITE
AL60	YELLOW

Standard and Heavy Duty

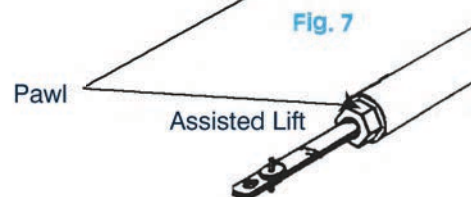


Fig. 7

**D4** Up to 13.6kg (30lb)

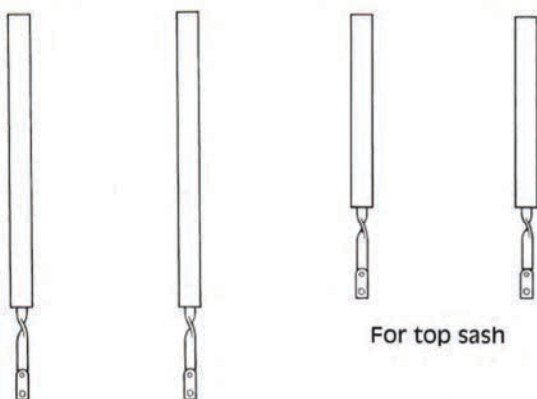
**D6** 13.6kg (30lb) - 18.1kg (40lb)



## Installing Balances

3

It is important to note that short balances are used for top sash and long balances for bottom sash, assuming sashes are of equal height.



For top sash

For bottom sash

Fig. 8

When sashes are of equal size and in lowered position, the balances can be easily inserted into the grooves (See Fig 9). In the case of unequal size sashes it is possible to slightly bow the balance for insertion into the groove of the larger sash. In some cases larger sashes may have been removed.

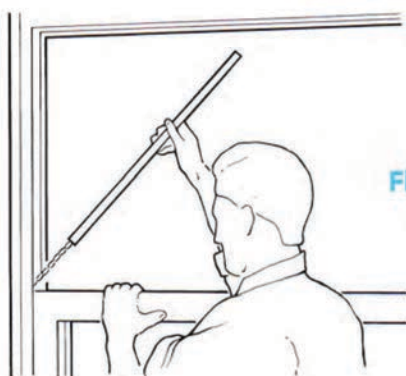


Fig. 9

Fix top balances to the frame jamb at the centre of the groove and tighten up against the frame head, using drive screws supplied. (Fig 10).



Fig. 10

## Fixing travel stops

4

Fix travel stops provided, the shorter one at the top of the bottom sash run. (See Fig. 11).

In the case of non-standard applications special stops may be required. In such cases suitable longer timber stops should be substituted for the standard metal type supplied. These should be long enough to prevent the balances from being extended by more than twice its tube length.

**IMPORTANT: FAILURE TO FIT TRAVEL STOPS MAY RESULT IN BALANCE FAILURE.**

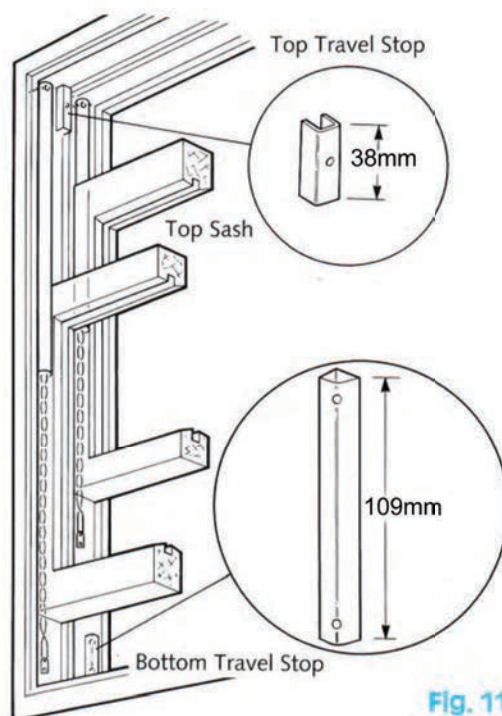


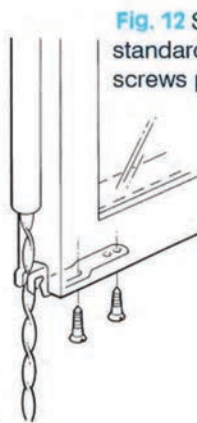
Fig. 11

## Fixing foot attachments

5

Raise the sashes as high as possible and prop up. **Fix foot attachment ensuring that spiral rod is located between sides of fitting.**

**Fig. 12** Secure standard foot with screws provided



**Fig. 13** Firstly fix channel with screws provided, then bend end of fitting to create interference fit, insert into channel and tap home.





## Balancing sashes – adjusting balances

6

### Adjusting 'D' Balances

Thread the spiral rod upwards into the tube by revolving anti-clockwise, left hand turn as viewed from underside (see Fig. 14). Using the hook tool provided, pull the spiral rod downward about 200mm (8ins) without rotating. Now apply adjustment turns in anticlockwise direction (see Fig. 15). Repeat adjustment for other balance, remove prop and then try sash action.

Correct balancing is achieved when sash is just held in its highest position. If necessary make adjustment turns in either direction on both balances obtain this condition.

**Do not over tension.**

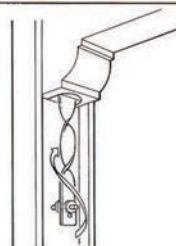


Fig. 14

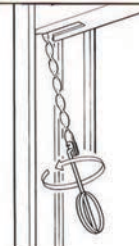


Fig. 15



Fig. 16

## Adjustment Charts - 'D' Balances

D4

		SASH WEIGHT											
Tube Length	Kgs	4.5	5.4	6.4	7.3	8.2	9.1	9.9	10.9	11.8	12.7	13.6	
Ins	Lbs	10	12	14	16	18	20	22	24	26	28	30	
10		1	1	1	1	2	2	2	3	3	3	3	
12		1	1	1	1	2	2	2	3	3	4	4	
14		1	1	2	2	3	3	3	4	4	4	5	
16		1	1	2	2	3	3	4	4	4	5	5	
18		1	1	2	3	3	4	4	4	5	5	6	
20		1	1	2	3	3	4	4	4	5	5	6	
22		1	1	2	3	3	4	4	4	5	5	6	
24		1	1	2	3	3	4	4	4	5	5	6	
26		1	1	2	3	3	4	4	5	5	6	6	
28		1	2	2	3	3	4	4	5	5	6	7	
30		1	2	2	3	4	4	4	5	5	6	7	
32		1	2	2	3	4	4	4	5	5	6	7	
34		1	2	2	3	4	4	5	5	6	7	8	
36		1	2	3	3	4	4	5	6	7	7	8	
38		1	2	3	3	4	4	5	6	7	8	8	
40		2	2	3	3	4	5	5	6	7	8	9	
42		2	2	3	4	4	5	6	7	8	8	9	
44		2	2	3	4	4	5	6	7	8	9	9	
46		2	2	3	4	4	5	6	7	9	9	10	
48		2	2	3	4	4	5	6	7	8	9	10	

D6

		SASH WEIGHT					
Tube Length	Kgs	14.5	15.4	16.3	17.2	18.1	
Ins	Lbs	32	34	36	38	40	
10		-	-	-	-	-	
12		-	-	-	-	-	
14		2	2	2	3	3	
16		2	2	3	3	4	
18		2	3	3	4	4	
20		2	3	3	4	4	
22		2	3	3	4	4	
24		3	3	3	4	5	
26		3	3	4	4	5	
28		3	3	4	4	5	
30		3	4	4	5	5	
32		3	4	4	5	5	
34		4	4	5	5	6	
36		4	4	5	5	6	
38		4	5	5	6	6	
40		4	5	5	6	6	
42		5	5	6	6	7	
44		5	5	6	6	7	
45		5	6	6	7	7	
46		5	6	6	7	8	
47		6	6	7	7	8	
48		6	6	7	8	8	

7

### Adjusting Assisted Lift Balances

Support the bottom sash in its highest position. Pull spiral rod down past balance foot using either the winding tool inserted into the hole at the end of the rod, or a loop of wire attached to the cross pin. Engage cross pin into the claws of the balance foot. Repeat on the other side of the sash. Remove support and operate sash up and down a few times.



Wire Loop

Support sash again. Using the winding tool, pull the spiral rod down out of the balance foot (a slight twist anti-clockwise may be required). If any tendency for the spiral rod to rotate is felt, rotate the spiral rod until a neutral position is found.

Now apply adjustment turns anti-clockwise as per adjustment chart (over). Maintaining a firm downward pressure with the winding tool whist tensioning.

Repeat for the other side of bottom sash.

Raise and lower sash. Sash should operate evenly. If sash falls from highest position or operates downwards harder than upwards and or take off a turn or two as necessary.



## Adjustment Charts - Assisted Lift

### AL 20

Balance Length	Sash Weight				
	20 - 21.9	22 - 23.9	24 - 25.9	26 - 27.9	28 - 29.9
6 - 10	2	2	2	3	4
11 - 15	2	2	2	4	5
16 - 20	3	3	4	5	6
21 - 25	3	4	4	6	7
26 - 30	4	5	5	6	7
31 - 35	4	5	5	7	9
36 - 40	5	6	6	8	10
41 - 45	5	6	6	8	10
46 - 50	6	7	7	9	11

### AL 30

Balance Length	Sash Weight				
	30 - 31.9	32 - 33.9	34 - 35.9	36 - 37.9	38 - 39.9
6 - 10	2	3	3	4	4
11 - 15	3	3	4	4	5
16 - 20	3	4	4	5	7
21 - 25	4	4	5	6	8
26 - 30	4	5	6	7	9
31 - 35	5	5	6	8	10
36 - 40	6	6	7	9	11
41 - 45	7	7	8	10	12
46 - 50	7	8	8	10	12

### AL 40

Balance Length	Sash Weight				
	40 - 41.9	42 - 43.9	44 - 45.9	46 - 47.9	48 - 49.9
6 - 10	4	5	6	7	8
11 - 15	5	6	7	8	9
16 - 20	5	6	7	8	9
21 - 25	7	7	9	9	10
26 - 30	8	8	9	10	12
31 - 35	8	9	10	11	13
36 - 40	9	9	10	12	13
41 - 45	9	10	12	12	13
46 - 50	10	10	12	13	14
51 - 55	10	10	13	14	15
56 - 60	11	11	13	14	15
61 - 65	11	11	15	16	17
66 - 70	11	12	15	16	17

### AL 50

Balance Length (Inches)	Sash Weight				
	50 - 51.9	52 - 53.9	54 - 55.9	56 - 57.9	58 - 59.9
6 - 10	7	8	9	10	10
11 - 15	7	9	10	11	11
16 - 20	8	10	11	12	12
21 - 25	8	11	12	12	13
26 - 30	10	11	13	13	14
31 - 35	11	12	13	14	15
36 - 40	11	12	14	15	16
41 - 45	12	13	14	15	16
46 - 50	13	13	14	16	17
51 - 55	14	14	15	16	17
56 - 60	14	15	15	17	18

### AL 60

Balance Length (Inches)	Sash Weight				
	60 - 61.9	62 - 63.9	64 - 65.9	66 - 67.9	68 - 69.9
6 - 10	4	5	6	7	8
11 - 15	4	5	6	7	9
16 - 20	5	6	8	9	10
21 - 25	6	8	9	10	12
26 - 30	8	9	10	12	14
31 - 35	10	1	11	13	15
36 - 40	10	1	12	14	15
41 - 45	11	1	12	14	16
46 - 50	11	1	12	15	16
51 - 55	12	1	13	15	17
56 - 60	12	1	13	16	17
61 - 65	13	1	15	16	18
66 - 70	16	1	17	17	18
71 - 75	16	1	17	18	19

### AL 70

Balance Length (Inches)	Sash Weight				
	70 - 71.9	72 - 73.9	74 - 75.9	76 - 77.9	78 - 79.9
6 - 10	3	4	5	6	7
11 - 15	4	5	6	7	8
16 - 20	5	6	7	8	9
21 - 25	6	7	8	9	9
26 - 30	6	7	8	10	10
31 - 35	8	9	10	11	11
36 - 40	9	10	11	11	12
41 - 45	10	11	12	12	13
46 - 50	10	11	12	13	14
51 - 55	11	12	12	13	14
56 - 60	11	12	12	13	14
61 - 65	12	12	13	14	15
66 - 70	12	13	13	14	15
71 - 75	12	13	14	15	16

### AL 80

Balance Length (Inches)	Sash Weight				
	80 - 81.9	82 - 83.9	84 - 85.9	86 - 87.9	88 - 89.9
6 - 10	4	5	6	7	8
11 - 15	5	6	7	8	9
16 - 20	6	7	8	9	10
21 - 25	7	8	8	9	10
26 - 30	7	8	9	10	11
31 - 35	8	9	9	10	11
36 - 40	9	10	12	14	15
41 - 45	9	10	12	14	15
46 - 50	11	11	12	15	16

## Important

**DON'T** bend the spiral rod.  
**DON'T** forget the limit stops.  
**DON'T** use 'D' balances on sashes over 18.1kg (40lb) glazed weight  
**DON'T** tensions balance more than necessary.  
**DON'T** tension before glazing.



Building Testing Limited  
Unit 12  
Wintonlea Industrial Estate  
Monument Way West  
Woking  
Surrey GU21 5EN

[t] 01483 766999  
[f] 01483 766111  
[e] [info@buildingtesting.co.uk](mailto:info@buildingtesting.co.uk)  
[w] [www.buildingtesting.co.uk](http://www.buildingtesting.co.uk)

**REPORT NO. G2521/6920**

**CYCLIC EXTENSION TESTING OF WINDOW SASH BALANCES**

**Mr Mark Fortune  
Mighton Products Ltd  
Hinxton Grange  
Hinxton  
Saffron Walden  
Cambridge  
CB10 1RG**

**8<sup>th</sup> August 2013**

**1.0 SUMMARY**

- 1.1 Two types of window sash balance have been subject to a 20,000 cyclic extension test programme.
- 1.2 Both samples completed the programme without signs of failure. At the end of the test period both samples appeared to operate as required.

**2.0 Introduction**

- 2.1 Brief: To carry out 20,000 cyclic extension testing of window sash balances. The test to extend each balance by a set length. Test to completion of required cycles or till failure. Failure mode/reasons to be recorded.
- 2.2 Order: Mighton Order 3209 and BTL Confirmation Form both dated 25/6/13 refer.

**3.0 Materials received****3.1 Sash balance construction**

Two types namely;

- D type single spring and spiral
- AL type double spring and spiral

Both types comprised a spring system encased in a white plastic sleeve with connection points at opposite ends.

- 3.2 These samples were referenced MT and received on 21/5/13. We understand these are Mightons current product. Dimensional details shown below.

D616	No markings Rated length 40cm Plastic sleeve 405mm long x 14mm diameter Through metal rivet for end connection Spiral strip 1.6mm x 5.88mm wide 2 holes at opposite end with 1 roll pin supplied
AL4027	Marking; Unique LL40 40@49lbs 3-28-13 Rated length 68cm Plastic sleeve 693mm long x 16.5mm diameter Through metal rivet for end connection and internal spring attachment Metal strip 1.5mm x 4.94mm wide with 2 x roll pins for end connection

- 3.3 Appendix 1 shows photographic details of samples received.

**4.0 Test programme**

4.1 The test programme was as instructed by Peter Copsey of Copsey Consultancy Ltd as follows;

- To carry out cyclic extension testing of window sash balances.
- Each sash balance to be extended by a set length.
- Each balance to undergo 20,000 cycles. (1 cycle = extension and return).
- Test to completion of required cycle number or till failure. Any failure mode/reasons to be recorded.

4.2 Extension lengths of each type.

Sash Balance type	Length (cm)	Max Extension length (cm)
D616	40	37
AL4027	68	62

4.3 To carry out this work each sample was installed into an automated test apparatus that extended and returned the samples over the extension distance required. This testing was carried out during working hours so visual inspections could be carried out as the testing progressed. On completion of the cycle period each sample tested was inspected for signs of failure.

4.4 This work was carried out during July 2013.

**5.0 Results**

Sash Balance type	Length (cm)	MT
D616	40	Cycles complete. No failure.  Observation: After testing it was noted that when the product was tipped upside down a plastic inner sleeve was free to move at the opposite end to the spiral movement end
AL4027	68	Cycles complete. No failure.  Observation: After 300 cycles a roll pin supplied and used to connect to the test rig came loose. This was replaced with a bolt to complete testing

5.1 Both types tested completed the 20,000 cycle programme without signs of failure.

Reported by



Ian Collins  
**Technical Manager**



**Appendix 1**

Photographic details of samples received

MT Samples



Showing D616 (bottom) and AL4027 (top)



Typical end connections