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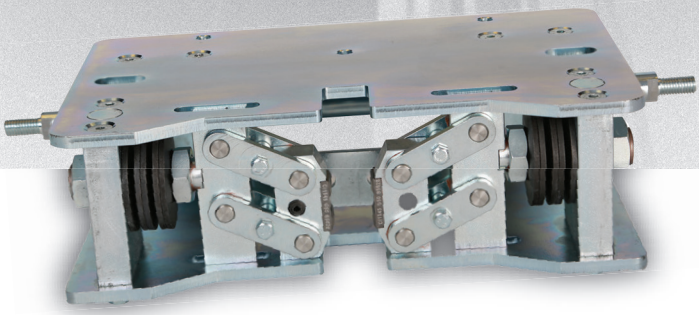
Installation and Adjustment Data
VG-8 Safety Gears



V2.0 – 2024

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Mounting and Installation

The VG-8 is a hybrid with the linkage mechanism of the VG-5 safety gear mounted within the footprint of the VG-4. It is bolted to the car frame or buffer channels via an adaptor / support plate as shown in figure TD-8.1. This is normally supplied and fitted by the car manufacturer to designs approved by Atwell International.

The lower surface of the safety gear is used for mounting the bottom car guide shoes either directly or using an adaptor plate.

1. The mounting and adjustment of the safety gear must be carried out with the guide shoes removed. The car balance should first be checked and any compensation weights added to ensure that the Out-of-Balance load (OBL) is within the rating of the guide shoes.

2. The car frame must be correctly positioned relative to the guide rails in both planes and blocked to maintain correct location while the safety gear is being fitted. Each safety gear end unit should be loosely bolted to the buffer channels or sub-frame member using 12mm diameter bolts.

3. The actuating arm and one transfer arm should be fitted to the governor end and one transfer arm fitted to the remote end as shown in the applicable Application drawing. The actuating and trasnfer arms can be fitted on either side of the safety gear to suit the location of the governor.

4. Each end assembly must be set square and central to the guide rails in both planes before tightening the bolts. This can be done by raising both gibs until they are in contact with the guide rail before tightening the bolts. When located correctly, the gap between the top of the insert holder and the underside of the top plate when the inserts are in contact with the guide rail should be between 8 to 9mm (see figure TD-8.1).

5. With the inserts still in contact with their respective guide rail, the guide shoes can be located centrally with the safety gear and clamped securely in place. Remove any blocking between sling and guide rail and release the actuating / transfer arms.

6. A connecting rod between the end assemblies should now be fitted to synchronise the actuation of both end units. The length of the rod should be adjusted, using clevis ends, so that both sets of inserts contact their respective guide rails simultaneously as the actuating arm is raised.

IMPORTANT CHECK – All inserts on all end units MUST contact the guide rails when the actuating arm is lifted. Check alignment of the guide shoes if this does not happen.

When both end units are correctly synchronised and centralised, the clevis ends should be locked using the nuts provided.

7. The safety gears can be pinned to their mounting plates by drilling through one or more pilot holes in the top plate and fitting 8mm diameter spring tension pins. This is recommended but not essential.

8. A rope anchorage bracket should be fitted to the sling and the operating rod adjusted so that the actuating arm is fully retracted. Check that the insert holders are not being lifted and the complete assembly operates freely before connecting to the governor rope.

Bi-Directional Operation

In common with all VG safety gears, the VG-8 can be inverted to act as an "upward-acting" brake. The mounting and installation is identical to the downward acting safety gear outlined previously.

The preferred arrangement is to place the downward acting safety gear beneath the lift car and the upward acting brake on the top of the lift car.

The Average Braking Force (ABF) required for an upward acting safety gear is substantially lower than that required for a down acting safety gear. An analysis is appended which shows that the ABF can be based on the formula 8(P+Q) compared with 16(P+Q) for a downward acting safety gear.

For braking in the "up" direction the VG-8 should be fitted with spring stack 3 and either carbide insert CDS01934 or insert CDS10013.

Overspeed Governor

The safety gear is designed to work with overspeed governors, of either the "drop-jaw" type or "friction" type. However, drop-jaw types are preferred, as these will not reset and release the safety gear if the lift car is jerked upwards by the counterweight falling back following an on-site activation.

Provided that the guide shoes are fitted correctly, the force required to engage a pair of "down" acting VG-8 safety gears is approximately 50 Newtons for single torsion springs and 90 Newtons when a pair of springs is fitted. For upward acting safety gears when fitted with 2 torsion springs, the force to engage a pair of safety gears is approximately 70 Newtons.

The minimum force exerted by the governor must be at least twice that required to engage the safety gear subject to a minimum force of 300 Newtons.

The mechanical tripping speed of the governor must be set in accordance with the current issue of EN81 or the equivalent National Standard.

Spreadsheet programme TD-4.3.1 can be used to check that the governor and tension weight for friction type governors complies with EN81.

Governor Rope Attachment

The VG-8 safety gear is supplied with a standard operating kit. Depending on the application, the governor rope is connected to the actuating arm either directly or via a suplementary kit. The maximum force that the safety gear operating arm is subjected to should not exceed 500 Newtons.

One standard arrangement is illustrated in figure TD-6.2. This shows a rope anchorage bracket fitted to the crown channels or suspension members. The bracket also incorporates an auxiliary inertia spring for lift travels greater than 25 metres.

The bracket permits full movement of the operating arm whilst preventing excess loads being applied to the operating linkage. The total travel of the safety gear actuating rod is 35mm. The first 26mm is used to raise the inserts into contact with the guide rail. Full engagement of the safety gear only occurs during thr final 8 to 9mm of travel. The standard rope anchorage brackets can withstand a maximum governor force of 1500 N.

Other operating arrangements are possible and reference should be made to "Application and Sales Data" sheets.

Inertia Springs

All VG safety gears are fitted with torsion springs to help overcome the governor system inertia when accelerating to the normal running speed of the lift. One torsion spring is fitted as standard to each end assembly when it is being used as a conventional downward acting safety gear. A force of 50 Newtons is required to engage a pair of safety gears. If two springs are fitted to each end assembly, the force will increase to 90 Newtons.

Single torsion springs should provide sufficient inertia force for lift travels up to 25 metres using a friction type governor fitted with rope diameters of 6 or 8mm.

Spreadsheet programme TD-4.3.1 can be used to check whether additional inertia springs are required for all popular applications.

When testing counterweight buffers, it is recommended that the safety gear is disconnected as lift car bounce may cause spurious operation of the safety gear.

Guide Rail Type

The VG-8 has been extensively tested on different combinations of guide rail manufacturers and carbide inserts.

As the guide rail manufacturer may be unknown when specifying VG safety gears, the adjustment data is based on the Average Friction Coefficient. The factory setting data for the various combinations of carbide insert and spring stacks is given in data sheet TD4.6.2.

Should on-site testing require the braking force to be adjusted, this can be achieved by increasing or decreasing dimension "Y" as illustrated in data sheet TD-8.1.

NB all brake adjusting nuts should be adjusted equally on all brake units.

Guide Rail Installation

Guide rails should be designed and installed in accordance with EN81 or equivalent National Code. The running surfaces should be free from rust or other contamination which could affect the braking capacity of the lifts. The joints between adjacent sections must be checked to ensure that steps are below 0.1mm.

Guide Rail Lubricant

The lubricant used in the certification of the VG-8 was ISO grade 68 oil. However, VG safety gears using carbide insert CDS10013 have been certified using other oils including:-

a. An 80 grade EP gear oil

b. A general 15-50 grade engine oil

c. A high pressure grease LG280

d. EP gear oil (Carter 460)

Consequently, Atwell Ltd is confident that many different grades of oil can be used without significantly affecting the braking force.

Safety Gear Switch

When the safety gear is engaged, a device mounted on the car shall initiate the stopping of the motor before or at the moment of safety gear operation. A suitable switch and operating cam can be mounted on either end or side of the safety gear end units.

On-site Testing and Adjustment

The safety gear has been adjusted to suit the load and Governor Tripping Speed stipulated on the serial label. CE / UKCA marked safety gears are type tested under "free fall" conditions to achieve an average deceleration rate of 0.6g.

When tested with the counterweight connected, the deceleration rate will be approximately 15% higher at around 0.73g. Therefore, to compensate for the braking effect of the counterweight, the test mass should be at least 25% higher than the rated capacity of the lift.

It should also be noted that the braking force of safety gears can vary with speed. The actual speed variation will depend on the maximum speed of the lift. However, at maximum rated speed and mass, the final deceleration may exceed 1g during the last 50mm of travel. Similarly, if tested with a load less than the maximum lift capacity, the average deceleration rate may also exceed 1g.

Under certain on-site test conditions, the counterweight may over-travel after the lift car has come to rest. The subsequent fall-back of the counterweigh may cause the lift car to be jerked upwards and release the safety gear. This cannot occur under "free-fall" test conditions which the safety gear has been certified.

When using "drop-jaw" governors, the safety gear will re-engage if the lift car is driven downwards. However, friction type governors may reset and release the safety gear thereby allowing it to descend once again. Some lift consultants may not accept this and may insist on having a drop-jaw governor fitted.

Routine Maintenance

At six monthly intervals, the following checks should be carried out:-

1. The actuating rod should be disconnected and the safety gear operated by hand to check that all moving parts are free and that the safety switch is operating correctly. The pivot points on the gibs and linkage and the disc springs should be sprayed with a water repellent lubricant if there is any sign of atmospheric corrosion.

2. Check that the gibs contact both faces of both guide rails when the actuating arm is raised. Adjust linkage rod and guide shoe location in accordance with installation data if the gibs are not clamping both guide rails correctly.

3. Inspect all pins and gib inserts for signs of corrosion, deformation or fractures and replace defective parts as required.

Periodic Safety Gear Operation

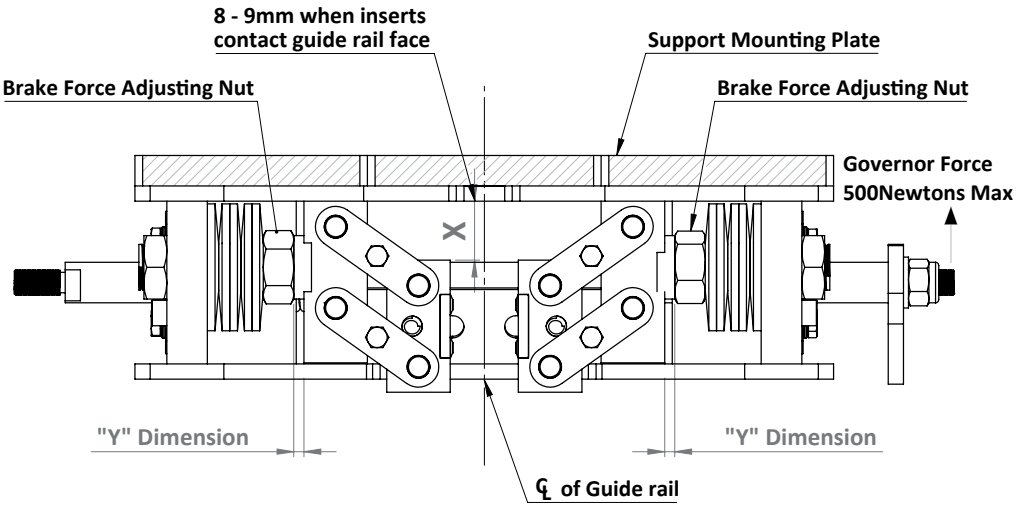
VG safety gears use a toothed carbide gib which cause localised and controlled grooving of the guide rail surface during braking. Extensive development into various types of braking media has confirmed that these provide the safest and most consistent braking on machined guide rails independent of the type of rail lubricant or surface condition.

During braking, the inserts produce parallel grooves approx 0.25mm deep by 0.5mm wide. These grooves can be smoothed quickly and easily using emery cloth, without impairing the integrity of the guide rail.

The VG-8 safety gear has also been tested over previously used sections of guide rail without any loss of Average Braking Force.

Each set of inserts should be capable of completing in excess of 10 full-load, full-speed safety gear checks before needing to be replaced. However, the inserts should should be inspected after each safety gear operation to confirm that they are in good condition and are not clogged with any braking residue or haave any broken teeth.

Dry or Lubricated Rails



BRAKE FORCE ADJUSTMENT NUTS ARE FACTORY SET TO THE SPEED AND LOADDATA IN TD-4.6.2. THE NUTS SHOULD ONLY BE ALTERED IN ACCORDANCE WITH THE TEST INSTRUCTIONS OUTLINED BELOW.

NOTE: - A TURN OF ONE FLAT OF THE NUT = 0.25MM MOVEMENT

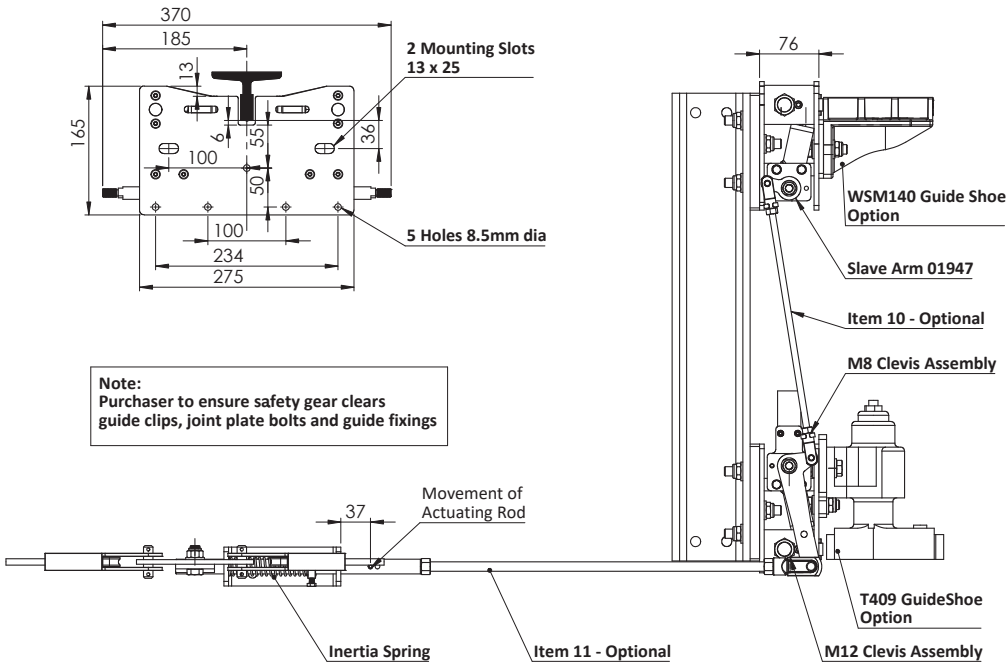
GOVERNOR SPEED	MAXIMUM SLIDE DISTANCE	MINIMUM SLIDE DISTANCE
1.0 m/sec	100 mm	71 mm
1.5 m/sec	225 mm	161 mm
2.0 m/sec	400 mm	286 mm
2.5 m/sec	625 mm	446 mm
2.63 m/sec	900 mm	643 mm

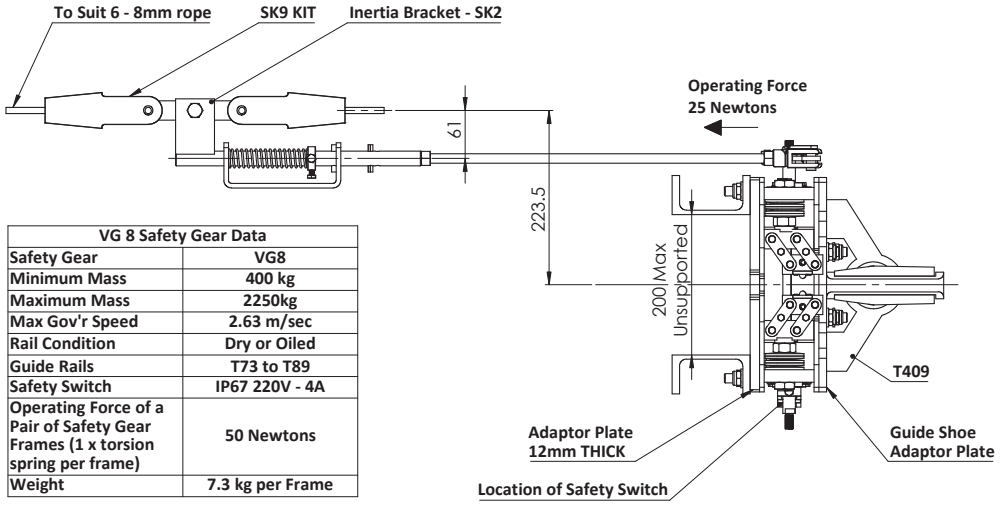
THE SLIDE DISTANCE WITH A 125% FULL LOAD AND WITH THE SAFETY GEAR ENGAGED AT THE GOVERNOR SPEED SHOULD BE BETWEEN THE MAXIMUM AND MINIMUM VALUES GIVEN ABOVE. THESE VALUES REPSENT DECELERATION RATES OF 0.5g AND 0.7g RESPECTIVELY.

SHOULD THE STOPPING DISTANCE BE OUTSIDE THE RANGE SHOWN, THE SAFETY GEAR CAN BE ADJUSTED BY INCREASING OR DECREASING THE SETTING DIMENSION "Y" SHOWN ABOVE. THE BRAKE ADJUSTING NUTS ON BOTH END ASSEMBLIES SHOULD BE ROTATED EQUALLY TO INCREASE OR DECREASE THE BRAKING FORCE.

THE LIFT SHOULD BE RE-TESTED AFTER EACH ADJUSMENT UNTIL THE SLIDE DISTANCE FALLS BETWEEN THE TWO VALUES. NOTE! THE GIB INSERTS SHOULD BE INSPECTED AFTER 10 TESTS AND CHANGED IF THERE IS ANY SIGN OF DETERIORATION.

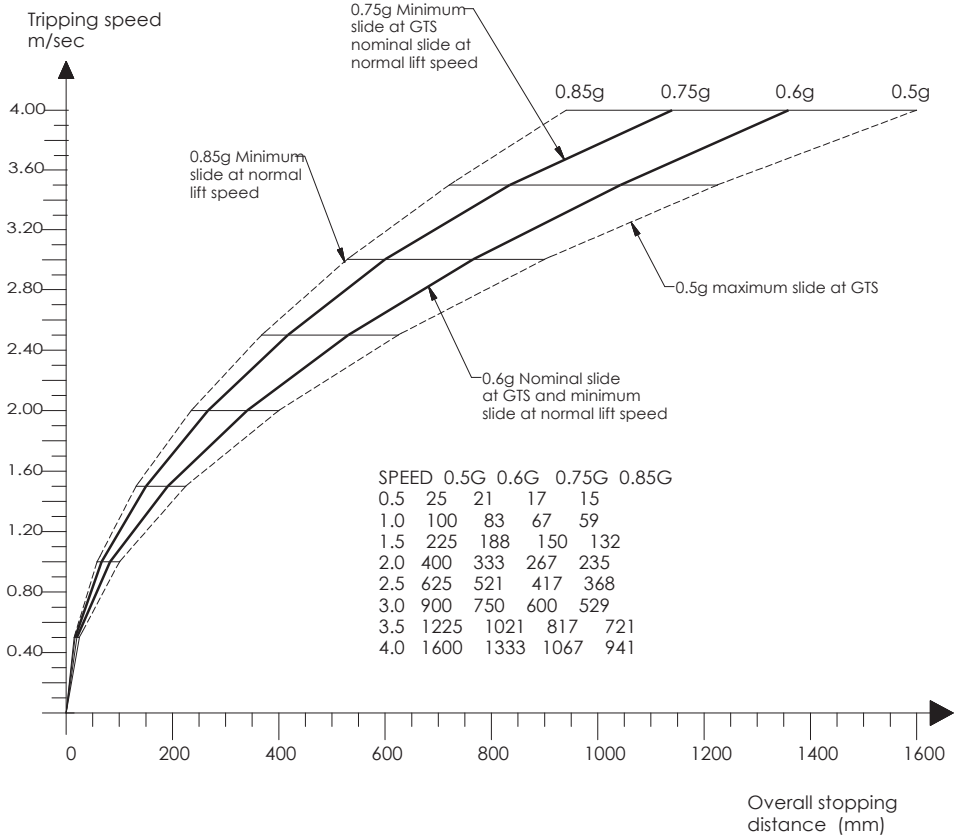
TD-8.2 Outline Dimensions





VG 8 Safety Gear Data	
Safety Gear	VG8
Minimum Mass	400 kg
Maximum Mass	2250kg
Max Gov'r Speed	2.63 m/sec
Rail Condition	Dry or Oiled
Guide Rails	T73 to T89
Safety Switch	IP67 220V - 4A
Operating Force of a Pair of Safety Gear Frames (1 x torsion spring per frame)	50 Newtons
Weight	7.3 kg per Frame

TD-2.8 - Tripping Speed Vs Braking Distance



SPEED	0.5G	0.6G	0.75G	0.85G
0.5	25	21	17	15
1.0	100	83	67	59
1.5	225	188	150	132
2.0	400	333	267	235
2.5	625	521	417	368
3.0	900	750	600	529
3.5	1225	1021	817	721
4.0	1600	1333	1067	941

VG safety gears are adjusted to give a deceleration of 0.6g under free fall conditions at the maximum governor tripping speed.(GTS) The above graphs give the braking distance of the safety gear for different deceleration rates and test speeds.

When the safety gear is tested at a lower speed with the counterweight attached an allowance must be made for the enhanced braking effect due to the different test speed.

To compensate for the effect of the counterweight, the test load must be 125% of the contract load

Due to the enhanced braking effect of progressive safety gears, the deceleration will increase to around 0.75g when tested at the normal lift speed.

For more accurate information and a worked example, please refer to technical dossier TD-2.8 and its computer programme TD-2.8 (Atwell International)

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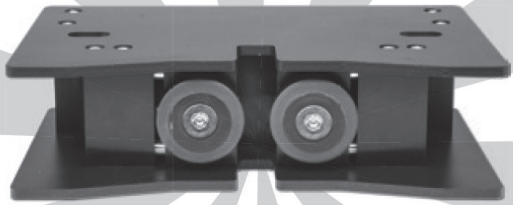
GAME CHANGER



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