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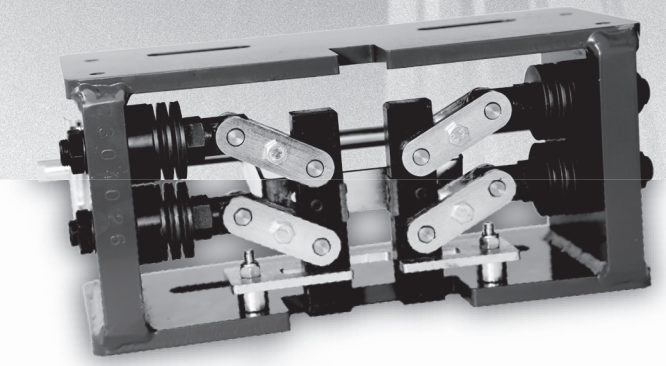
Installation and Adjustment Data
VG-2a Safety Gears



V2.0 – 2024

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Mounting and Installation

VG safety gears are designed to be bolted directly to the car frame or buffer channels using the slotted holes provided and must be supported by the car frame as illustrated in figure TD-2.2. If the distance between the support members is greater than 125mm then a support plate must be provided by the car manufacturer.

The lower surface of the safety gear is used for mounting the bottom car guide shoes using an appropriate adapter plate. It is permitted to machine additional slots or holes in the top/bottom plates within 25mm of the centreline of the fixing slots.

1. The mounting and adjustment of the safety gear should be carried out with the bottom 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 16mm diameter bolts.

3. 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 gib and the underside of the top plate is less than 12mm (see figure TD-2.1).

4. With the gibs in contact with their respective guide rail, fit the guide shoes and clamp securely in place. Remove any blocking between sling and guide rail and release the gibs.

5. The operating arm should be fitted to the governor end and the lever crank fitted to the remote end as shown in figure TD-SK1 using the 8mm screw sets provided. The arm can be fitted on either side of the safety gear to suit the location of the governor.

The connecting rod between the end assemblies should also be fitted. The length of the rod should be adjusted using the clevis ends so that both sets of gibs contact their respective guide rails simultaneously when the operating arm is lifted.

IMPORTANT CHECK – All gibs MUST contact the guide rail when the actuating arm is lifted.

When correctly adjusted, the clevis ends should be locked using the nuts provided.

6. The rope anchorage bracket should be fitted to the sling and the operating rod length adjusted to suit the position of the operating arm. Check that the gibs are not being lifted and the complete assembly operates freely before connecting to the governor rope.

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 release the safety gear if the lift car "bounces" during a safety gear activation. 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: part 1 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

All VG safety gears are supplied with a standard operating kit SK1. Depending on the application, the governor rope is connected to the actuating arm either directly or via supplementary kits. 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-2.2. This shows a rope anchorage bracket (kit SK2) fitted to the crown channels or suspension members. The bracket also incorporates an auxiliary inertia spring for lift travels above 40 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 44mm. The first 30mm is used to raise the gibs into contact with the guide rail. The gibs clamp the guide rail during the final 14mm of travel. The standard bracket can withstand a maximum governor force of 1500N.

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

Inertia Spring Setting - Travels above 50 metres

Since 2001, all VG safety gears have been fitted with torsion springs to overcome the governor system inertia. One torsion spring is fitted to each end assembly when being used as a conventional safety gear. Two torsion springs are fitted when the safety gear is inverted and is being used as an "up" brake.

Torsion springs should provide sufficient inertia force for lift travels up to 50 metres with governor rope diameters of 6 or 8mm. An auxiliary inertia spring using kit SK3 may be required for installations with governor rope diameters above 8mm and/or lift travels above 50 metres.

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 range of safety gears have all been type-tested using class one guide rails with a super-brushed finish. These rails may have a lower friction coefficient than standard machined guide rails and VG safety gears are adjusted assuming these rails are to be used.

VG safety gears can be used with rails having a coarser surface finish but they may brake harder than required. If on-site testing indicates that the braking force needs to be adjusted, this can be done by a competent person by adjusting the "Y" dimension indicated in drawing TD-2.1.

Note:- Sliding guide shoes running on standard finish guide rails may become polished in service. This may lower the braking force over time and it is recommended that the braking force is checked periodically to ensure that there has been no deterioration. Should the brakes require adjusting, this can be done on-site.

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 effect the braking capacity of the lifts. The joints between adjacent sections must be checked to ensure that steps are below 0.25mm.

Guide Rail Lubricant

VG safety gears have been tested using an ISO grade 68, an 80 grade EP gear oil and a general 15-50 grade engine oil. Cameron Design is confident that different grades of oil can be used if these are not available.

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 as illustrated in figure 2.2.

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

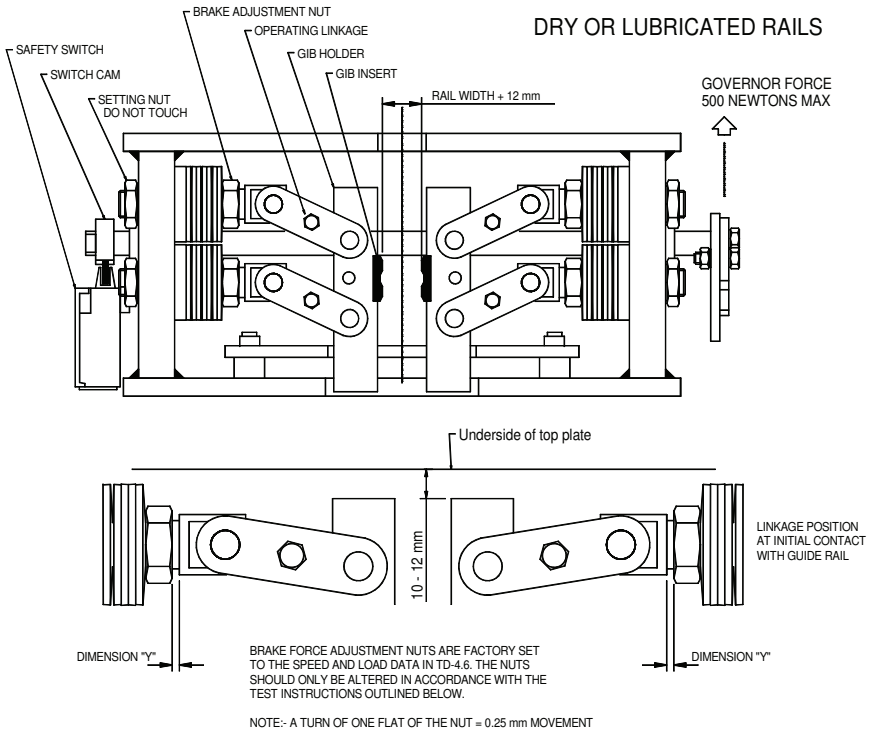
VG safety gears use a toothed carbide gib which cause localised and controlled grooving of the guide rail surface. Extensive development into various types of gib materials has confirmed that these provide the safest and most consistent braking on smooth guide rails, independent of the type and degree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

During safety gear operation, the gibs produce 8 parallel grooves approx 0.15mm deep by 0.25mm wide. These grooves can be smoothed quickly and easily using emery cloth, without impairing the integrity of the guide rail. VG safety gears have been tested on a previously used section of guide rail without any loss of braking force.

Extensive type-testing has also confirmed that the wear rate of carbide inserts is much lower than conventional cast iron or steel gibs. Each set of inserts should be capable of completing a **minimum** of 10 full-load, full-speed safety gear checks before being replaced. However, the inserts should be inspected after each safety gear operation to confirm that they are in good condition.

During a public demonstration at the Augsburg International Lift Exhibition in 2007, a VG-4 safety gear was drop-tested repeatedly at 2.0m/sec over the same section of guide rail. After 150 tests, the grooves had increased to only 0.4mm deep and there was no loss of braking force. After testing was discontinued, both the guide rail and inserts were still serviceable.

TD-2.1 Safety Gear Adjustment Data



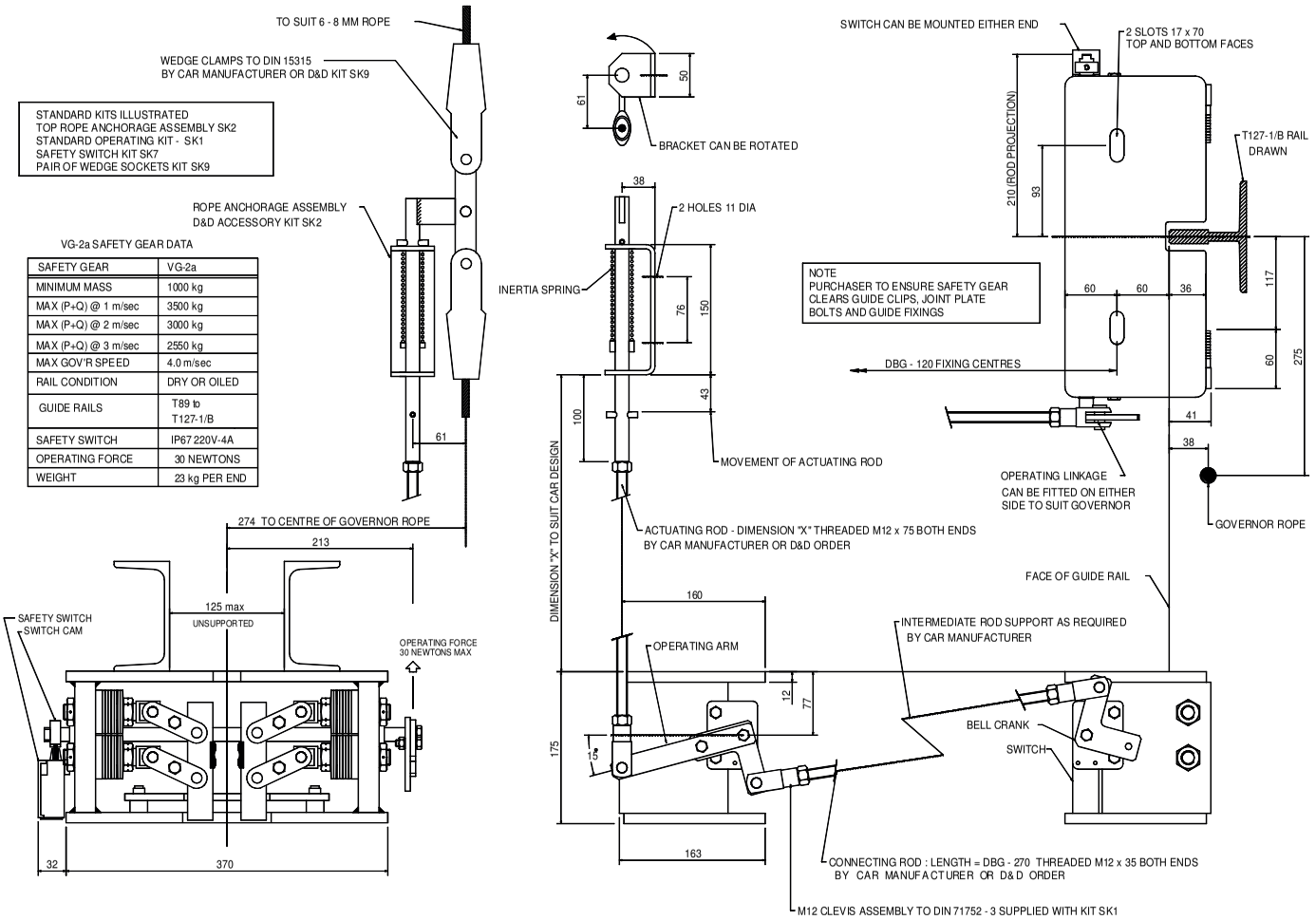
RATED (P+Q) SAFETY GEAR	GOVERNOR SPEED	RATED (P+Q) "UP" BRAKE	MAXIMUM Slide Distance	MINIMUM Slide Distance
3770 kg	0.5 m/sec	7540 kg	25 mm	**18 mm**
3500 kg	1.0 m/sec	7000 kg	100 mm	71 mm
3245 kg	1.5 m/sec	6490 kg	225 mm	161 mm
3000 kg	2.0 m/sec	6000 kg	400 mm	286 mm
2770 kg	2.5 m/sec	5540 kg	625 mm	446 mm
2550 kg	3.0 m/sec	5100 kg	900 mm	643 mm
2350 kg	3.5 m/sec	4700 kg	1225 mm	875 mm
2150 kg	4.0 m/sec	4300 kg	1600 mm	1143 mm

THE SLIDE DISTANCE WITH A FULL LOAD AND WITH THE SAFETY GEAR ENGAGED AT THE GOVERNOR SPEED SHOULD BE BETWEEN THE MAXIMUM AND MINIMUM VALUES GIVEN ABOVE. THESE VALUES REPRESENT 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 TO INCREASE OR DECREASE THE BRAKING FORCE.

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

TD-2.2 Outline Dimensions



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 varies with speed. The actual speed variation will depend on the maximum speed of the lift. However, at governor tripping speeds above 2.3 m/sec, the final deceleration may exceed 1g. Furthermore, if tested with a load less than the maximum lift capacity, the average deceleration rate may also exceed 1g.

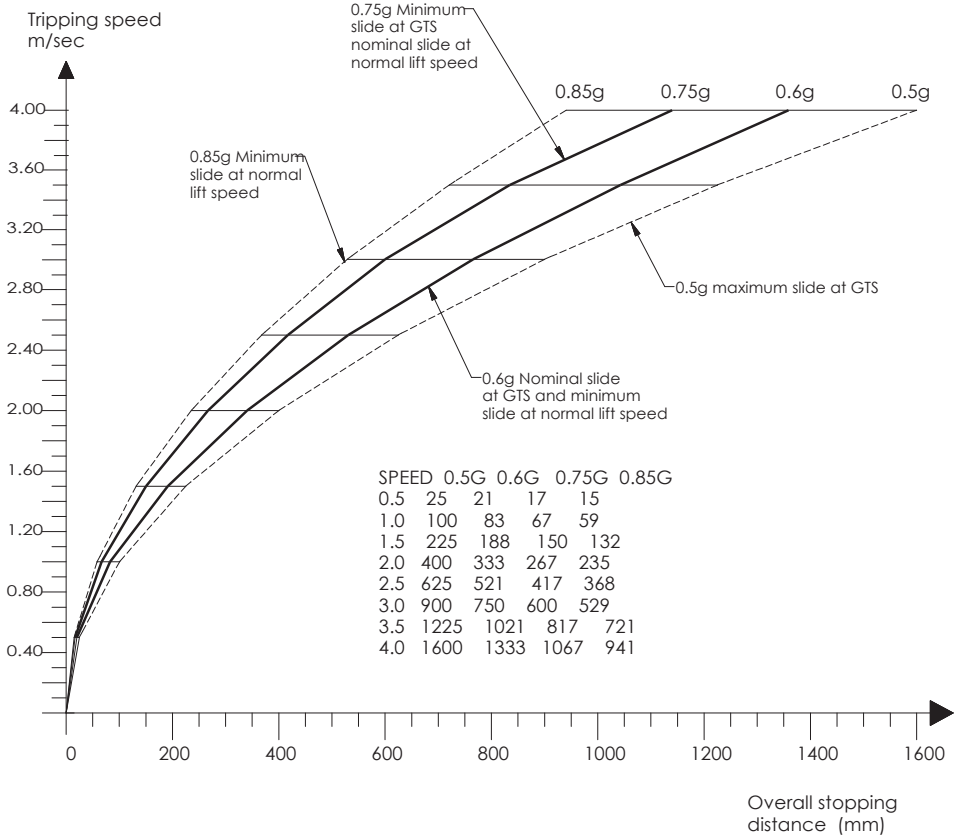
If the deceleration exceeds 1g, the subsequent fall-back or "bounce" of a counterweight will cause the lift car to be jerked upwards and could cause the safety gear to disengage.

It must be stressed that this will not happen under free-fall conditions that the safety gears have been tested.

This is not a problem provided the governor does not release the safety gear. Any attempt to drive the lift car down again should immediately cause the safety gear to re-engage.

However, friction type governors will disengage if the counterweight bounces and some lift consultants may not accept this. Under these circumstances, the only solution without invalidating the CE / UKCA marking of the safety gears, is to fit a drop-jaw type governor.

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.

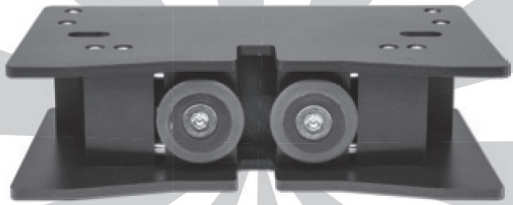
To compensate for the effect of the counterweight, the test load must be 125% of the contract load

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)

A genuine

GAME CHANGER



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Ai speed watcher

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