

TSC Combined Steel Spring and Rubber Spring Unit Isolators

Sizes T1, T2, T3 & T10



A major advance in design has successfully combined the best characteristics of steel springs and rubber springs to produce an efficient, compact and economical range of unit isolators suitable for many types of applications. Many variants of these isolators, designed and manufactured by us have now been in service for more than twenty years.

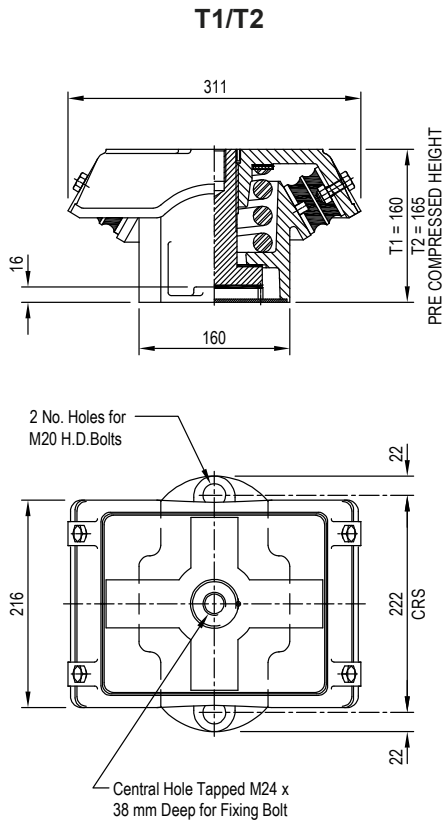
TSC unit isolators are highly effective in reducing the transmission of vibration, structure-borne noise and shock from a wide range of rotating and reciprocating machinery and in protecting sensitive apparatus from external disturbances. They are particularly suitable for marine and mobile applications as internal snubbers are incorporated to control movement of the isolated machine.

Type approval by Det Norske Veritas and general type approval has been given by Lloyd's Register of Shipping.

DESIGN FEATURES

- Helical steel spring to BS1726 Class B.
- Inclined rubber springs are first grade natural rubber to metal bonded elements.
- SG iron castings to BS EN 1563 EN-GJS-400/15. Alternative lightweight aluminium castings to BS EN 1706 (Size T3 only).
- Steel spring in most variants is isolated from the top casting by resilient seating pad reducing transmission of high frequency vibration and effectively damping spring coil surge resonance.
- Springs are pre-compressed on assembly, resulting in high equivalent static deflection and load capacity with minimum change between loaded and unloaded height.
- Rubber spring elements are effectively protected by the top casting and its extended skirt.
- Both types of spring support a proportion of the total load and thus the overall rate of creep is much reduced compared to an equivalent all-rubber unit isolator.
- A selection of steel and rubber springs, each having different vertical and lateral stiffness closely controlled in manufacture is available to facilitate the choice of the most appropriate isolator characteristics for a particular application.
- Combined rebound and overload buffer is adjustable to permit optimum setting to be achieved throughout service life (Size T3 only).
- Optional soleplate is available to facilitate installation on resin chocks.
- Optional proof plates are available to enable removal of mountings for refurbishment (marine propulsion engines only).

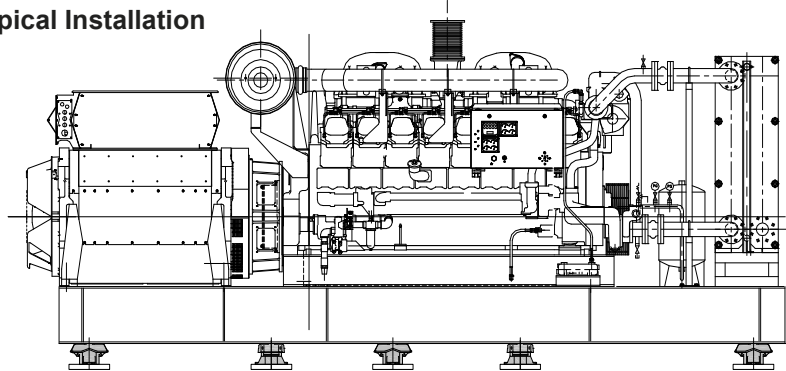
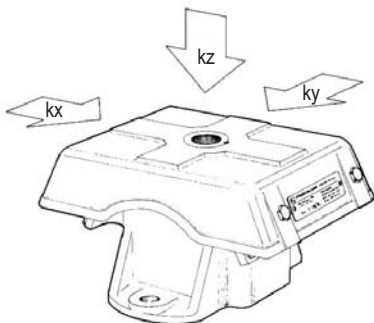
TYPE TSC ISOLATORS SIZES T1 & T2



| REFERENCE | VERTICAL LOAD RANGE (kg) | DYNAMIC STIFFNESS (kN/m) | | | WEIGHT (kg) MAX |
|-----------|--------------------------|--------------------------|------------|------|-----------------|
| | | VERTICAL | HORIZONTAL | | |
| | | | kz | kx | |
| T1 15/45 | 900 - 1300 | 1221 | 2912 | 583 | 28.9 |
| T1 20/45 | 1200 - 1600 | 1310 | 3036 | 717 | |
| T1 25/45 | 1500 - 1950 | 1373 | 3140 | 798 | |
| T1 30/45 | 1900 - 2250 | 1519 | 3295 | 966 | |
| T1 20/60 | 1400 - 2100 | 2560 | 5861 | 1050 | |
| T1 25/60 | 1750 - 2350 | 2667 | 5934 | 1137 | |
| T1 30/60 | 2000 - 2800 | 2772 | 6097 | 1300 | |
| T1 40/60 | 2800 - 4000 | 3689 | 7589 | 2777 | |
| T1 20/70 | 1600 - 2350 | 4250 | 10791 | 1714 | |
| T1 25/70 | 1800 - 2800 | 4341 | 10873 | 1805 | |
| T1 30/70 | 2200 - 3150 | 4446 | 11068 | 1958 | |
| T1 40/70 | 2900 - 4100 | 5358 | 12570 | 3446 | |
| T2 15/45 | 1180 - 1360 | 762 | 1141 | 546 | 28.4 |
| T2 20/45 | 1290 - 1600 | 858 | 1265 | 678 | |
| T2 20/55 | 1500 - 1800 | 1183 | 1817 | 787 | |
| T2 20/60 | 1700 - 2170 | 1488 | 2591 | 983 | |
| T2 25/60 | 2080 - 2500 | 1586 | 2688 | 1070 | |
| T2 30/60 | 2370 - 2750 | 1694 | 2840 | 1232 | |
| T2 30/70 | 2600 - 3150 | 2627 | 4697 | 1716 | |
| T2 30/75 | 2800 - 3560 | 3955 | 7193 | 2310 | |
| T2 40/60 | 2750 - 3900 | 2610 | 4336 | 2699 | |
| T2 40/70 | 3200 - 4200 | 3538 | 6161 | 3186 | |

- All values of stiffness are nominal subject to $\pm 15\%$ variation on final assembly. The isolator rubber elements are pre-loaded 6 mm upon assembly.
- Stiffness is linear over working load range.
- Dynamic stiffness may vary with frequency. Values stated are reliable for calculation of low frequency characteristics below 100 Hz.

Typical Installation



Diesel driven alternator set on T2 isolators

Application Notes:

- Optimum system stiffness characteristics can be achieved by careful orientation of individual isolators.
- All connections to and from isolated machine must include flexible lengths, not only to prevent transmission of vibration through the connections and allow the system freedom of movement, but also to avoid possible failure of the connections.
- Analysis of the isolated system is normally undertaken by Christie & Grey to predict the response to ship motion, machine forces and shocks to enable the correct selection of flexible connections.

For full installation instructions please refer to our data sheets DS022 and DS040.

For more detailed information and technical assistance please contact our Technical Department.

In the interests of continual development, the Company reserves the right to make modifications to these details without notice.



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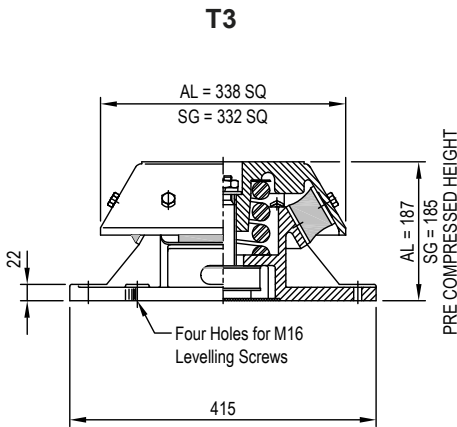
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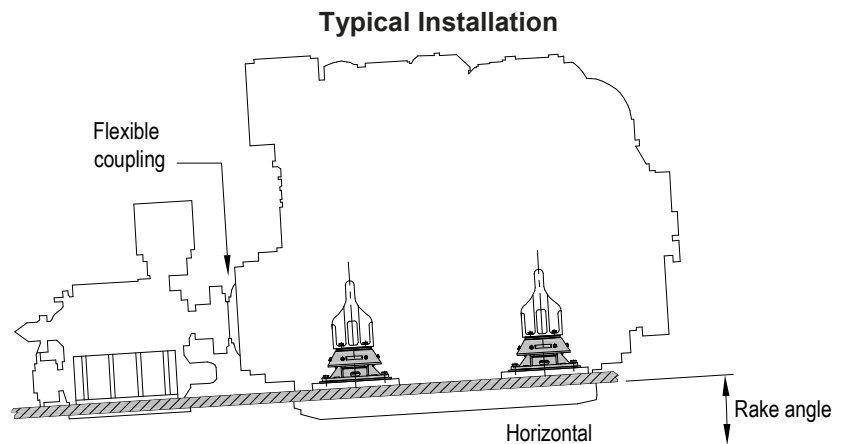
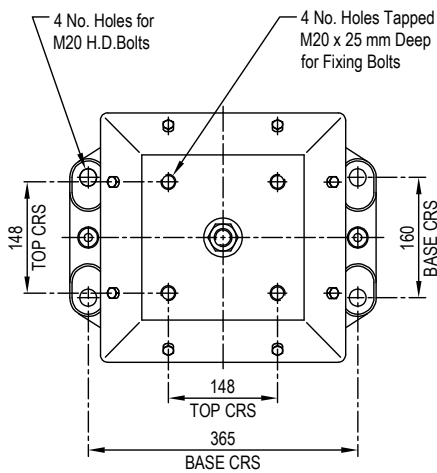


TYPE TSC ISOLATOR SIZE T3



| REFERENCE | VERTICAL LOAD RANGE (kg) | DYNAMIC STIFFNESS (kN/m) | | WEIGHT (kg) MAX |
|-----------|--------------------------|--------------------------|------------|-----------------|
| | | VERTICAL | HORIZONTAL | |
| T3 35/20 | 1100 - 1700 | 1050 | 1269 | 52.3 |
| T3 45/20 | 1300 - 2000 | 1375 | 1501 | |
| T3 35/40 | 1500 - 3000 | 2163 | 3016 | |
| T3 55/20 | 1600 - 2700 | 2040 | 2166 | |
| T3 45/40 | 1700 - 3400 | 2493 | 3224 | |
| T3 60/20 | 1800 - 3200 | 2665 | 3148 | |
| T3 55/40 | 2100 - 3950 | 3135 | 3905 | |
| T3 55/30 | 2150 - 3700 | 2243 | 2422 | |
| T3 60/40 | 2350 - 4600 | 3772 | 4879 | |
| T3 70/40 | 2700 - 5300 | 5609 | 7182 | |
| T3 60/50L | 3500 - 5600 | 4037 | 4463 | |
| T3 60/60L | 4200 - 6500 | 4687 | 5419 | |
| T3 70/60L | 4400 - 7250 | 6165 | 7294 | |

- All values of stiffness are nominal subject to $\pm 15\%$ variation on final assembly. The isolator rubber elements are pre-loaded 6 mm upon assembly (with aluminium bases by 4 mm).
- Stiffness is linear over working load range.
- Dynamic stiffness may vary with frequency. Values stated are reliable for calculation of low frequency characteristics below 100 Hz.



Marine diesel propulsion engine on T3 isolators

Application Notes:

- All connections to and from isolated machine must include flexible lengths, not only to prevent transmission of vibration through the connections and allow the system freedom of movement, but also to avoid possible failure of the connections.
- Provision is made for levelling screws in the base of each isolator to facilitate installation and alignment, particularly if, for example, a flexibly mounted prime mover is driving a solidly mounted gearbox.
- Analysis of the isolated system is normally undertaken by Christie & Grey to predict the response to ship motion, machine forces and shocks to enable the correct selection of flexible connections.

For full installation instructions please refer to our data sheets DS013, DS035 and DS040.

For more detailed information and technical assistance please contact our Technical Department.

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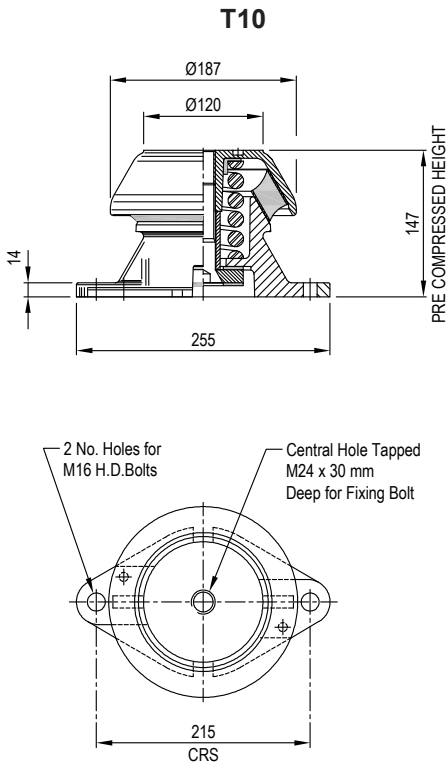
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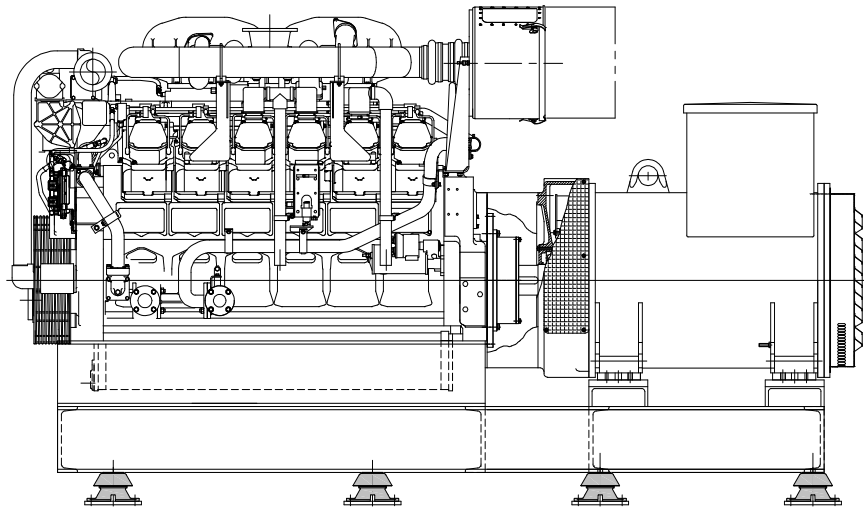
TYPE TSC ISOLATOR SIZE T10



| REFERENCE | VERTICAL LOAD RANGE (kg) | DYNAMIC STIFFNESS (kN/m) | | WEIGHT (kg) MAX |
|-------------|--------------------------|--------------------------|------------|-----------------|
| | | VERTICAL | HORIZONTAL | |
| T10 45/100 | 400 - 700 | 752 | 813 | 9.0 |
| T10 45/200 | 450 - 750 | 779 | 833 | |
| T10 45/300 | 510 - 860 | 848 | 898 | |
| T10 45/400 | 560 - 910 | 850 | 910 | |
| T10 45/500 | 620 - 950 | 854 | 905 | |
| T10 45/600 | 720 - 1050 | 973 | 1022 | |
| T10 45/800 | 830 - 1200 | 987 | 1016 | |
| T10 45/1000 | 1150 - 1550 | 1248 | 1273 | |
| T10 65/200 | 960 - 1690 | 2421 | 2682 | 9.0 |
| T10 65/300 | 1020 - 1790 | 2439 | 2676 | |
| T10 65/400 | 1060 - 1810 | 2442 | 2693 | |
| T10 65/500 | 1130 - 1910 | 2476 | 2727 | |
| T10 65/600 | 1200 - 2000 | 2535 | 2738 | |
| T10 65/800 | 1320 - 2150 | 2576 | 2781 | |
| T10 65/1000 | 1600 - 2500 | 2712 | 2902 | |
| T10 65/1500 | 2100 - 3000 | 2618 | 2743 | |

- All values of stiffness are nominal subject to $\pm 20\%$ variation on final assembly. The isolator rubber elements are pre-loaded 5 mm upon assembly.
- Stiffness is linear over working load range.
- Dynamic stiffness may vary with frequency. Values stated are reliable for calculation of low frequency characteristics below 100 Hz.

Typical Installation



TSC T10 isolators used on a generating set

Application Notes:

- All connections to and from isolated machine must include flexible lengths, not only to prevent transmission of vibration through the connections and allow the system freedom of movement, but also to avoid possible failure of the connections.
- Analysis of the isolated system is normally undertaken by Christie & Grey to predict the response to ship motion, machine forces and shocks to enable the correct selection of flexible connections.

For full installation instructions please refer to our data sheets DS040 and DS060.

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