# GD RECTIFIERS LTD

# Selenium Rectifiers

**GD RECTIFIERS LTD** supply replacements for selenium (metal plate) rectifiers once manufactured by STC but which are now obsolete. These replacements use modern plates and have electrical ratings which are generally higher than the originals due to present day technology, coupled with the need to meet already existing mounting and connecting arrangements.

In general, all rectifiers consisting of plates mounted on spindles are matched quite readily, with the exception of size 17 stacks which require additional mounting parts to reach the original fixing centres.

Early stacks calling for fins or cooling funnels can be replaced by assemblies without these aids. Nevertheless ratings and fixing centres are maintained without difficulty.

Equivalents to the following standard stacks will be supplied upon provision of the original type references:

*Stacks made with plate sizes 17, 18, 25, 35, 40, 45, 67, 84, 112, and 125.*
*Series 400.*
*Series 800.*
*Series HC (high current density).*
*RM4 and SM5.*
*900 series SafeTstaCs.*
*FSP series SafeTstaCs.*
*280/LU.*
*FAB, FAG, FAW, FSB, FSG, FSW, etc.*

Non-standard variants of any of the above are supplied, but in some cases a sample of the original type may be required.

Replacements for wire ended types, contact cooled units, click suppressors, etc., may be possible, perhaps with alternative devices such as silicon diodes, silicon bridges, varistors or specially fabricated assemblies (e.g. for high voltage rectifiers).

Usually, immediate answers are given upon receipt of enquiries for standard types, and for others a day or so may be required for research or assessment of the application.

Delivery is from 2 days for breakdown service to 7-10 days normal delivery. Units requiring the manufacture of special parts will take a few days more.

**OTHER G D PRODUCTS**

Selenium rectifiers for new equipment and replacements for other manufacturers products (e.g. Westinghouse, Automat, Salford Electric, International Rectifier, Semikron, AEG, Siemens, etc.)
Selenium surge suppressors (L-SELS).
Silicon diodes.
Thyristors.
Varistors (SiC and MOV).
Silicon rectifier assemblies, all configurations and ratings.
Thyristor assemblies, all configurations and ratings.
Thyristor firing units.
Custom-built assemblies (e.g. high voltage rectifiers for radio transmitters; replacements for valve rectifiers).

*All enquiries should be made to:*

**G D RECTIFIERS LTD** Tel: (0444) 243452 Fax: (0444) 870722

# Selenium Rectifiers

## Sizes of Plates and Admissible Load for 25 and 30 V Reverse Voltage plates

| Supply | | Single-phase | | | | | Three-phase | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Circuit | | Single-phase half-wave | | Single-phase centre-tap | | Single-phase bridge | | Three-phase half-wave | | Three-phase bridge | | Six-phase star | | Six-phase star with interphase transformer |
| Diagrams and code letters | | E | | M | | B | | S | | DB | | DS | | DSS |
| Number of arms | | 1 | | 2 | | 4 | | 3 | | 6 | | 6 | | 6 |
| Maximum reverse voltage of the rectifier plates (admissible a.c. input voltage $V_2$) | for resistive and inductive load | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V |
| | for capacitive load | 12.5V | 15V | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V | 25V | 30V |
| D.C. output voltage at rated current approx. value | for resistive and inductive load | 10V | 12V | 10V | 12V | 20V | 24V | 15V | 18V | 30V | 36V | 15V | 18V | 13V | 15V |
| | for capacitive load | 12.5V | 15V | 12.5V | 15V | 25V | 28V | 15V | 18V | 30V | 36V | 15V | 18V | 13V | 15V |
| Dimensions of plates mm × mm | | Rated mean direct current (A) for natural cooling and 35°C ambient temperature*) | | | | | | | | | | | | | |
| 20 × 20 | | 0.35 | 0.3 | 0.7 | 0.55 | 0.7 | 0.55 | 1 | 0.8 | 1 | 0.8 | 1.7 | 1.5 | 2 | 1.8 |
| 25 × 25 | | 0.6 | 0.5 | 1.2 | 1 | 1.2 | 1 | 1.7 | 1.5 | 1.7 | 1.5 | 3 | 2.5 | 3.6 | 3 |
| 33 × 33 | | 1.2 | 1 | 2.4 | 2 | 2.4 | 2 | 3.6 | 3 | 3.6 | 3 | 6 | 5 | 7 | 6 |
| 33 × 50 | | 1.7 | 1.4 | 3.4 | 2.8 | 3.4 | 2.8 | 5 | 4 | 5 | 4 | 8.5 | 7 | 10 | 8.5 |
| 50 × 50 | | 2.5 | 2 | 5 | 4 | 5 | 4 | 7.5 | 6 | 7.5 | 6 | 12 | 10 | 15 | 12 |
| 50 × 83 | | 4 | 3.2 | 8 | 6.4 | 8 | 6.4 | 12 | 10 | 12 | 10 | 20 | 16 | 24 | 20 |
| 50 × 100 | | 5 | 4 | 10 | 8 | 10 | 8 | 15 | 12 | 15 | 12 | 25 | 20 | 30 | 24 |
| 63 × 100 | | 6 | 5 | 12 | 10 | 12 | 10 | 18 | 15 | 18 | 15 | 30 | 25 | 36 | 30 |
| 83 × 100 | | 7.5 | 6 | 15 | 12 | 15 | 12 | 22.5 | 18 | 22.5 | 18 | 36 | 30 | 45 | 36 |
| 100 × 100 | | 9 | 7.5 | 18 | 15 | 18 | 15 | 27 | 22.5 | 27 | 22.5 | 45 | 36 | 54 | 45 |
| 100 × 125 | | 12 | 10 | 24 | 20 | 24 | 20 | 36 | 30 | 36 | 30 | 55 | 45 | 72 | 60 |
| 100 × 200 | | 18 | 15 | 36 | 30 | 36 | 30 | 54 | 45 | 54 | 45 | 90 | 72 | 108 | 90 |
| 100 × 250 | | 24 | 20 | 48 | 40 | 48 | 40 | 72 | 60 | 72 | 60 | 110 | 90 | 144 | 120 |
| 100 × 300 | | 27 | 22.5 | 54 | 45 | 54 | 45 | 81 | 67 | 81 | 67 | 130 | 100 | 160 | 130 |
| 100 × 375 | | 36 | 30 | 72 | 60 | 72 | 60 | 108 | 90 | 108 | 90 | 165 | 135 | 216 | 180 |
| 100 × 400 | | 36 | 29 | 72 | 58 | 72 | 58 | 100 | 80 | 100 | 80 | 175 | 140 | 200 | 160 |
| 100 × 500 | | 48 | 40 | 96 | 80 | 96 | 80 | 145 | 120 | 145 | 120 | 225 | 170 | 280 | 230 |

*For forced cooling with cooling air velocity about 3m/sec. the current may be double the rated value; in this case the d.c. will be about 4% less.

Plates 100 × 200 mm and larger. For forced cooling with air velocity about 6m/sec. the current may be three times the rated value: in this case the d.c. voltage will be about 7% less: for oil cooling the recommended current depends on oil temp.: ratings on request.

By parallel connection the larger plates can be used at higher current ratings in this case the load should be reduced by 9% for five to seven parallel paths and by 10% for seven or more parallel paths: for doubtful applications consult our Engineering Department.

## Code-Designation of Selenium Rectifiers

GD selenium rectifier stacks are designated according to the following example.

This designation indicates circuit, rated a.c. voltage, nominal d.c. voltage and direct current rating of the stack.

**Example:** code letter for circuit*
- rated a.c. voltage in V
- nominal d.c. voltage in V
- rated direct current in A
- code letter for assisted cooling
  - F forced air cooling
  - UP oil cooling
  - (omitted for standard arrangement)

B 150/120-12
S 400/224-90 F

* E — Single-phase half-wave
V — Voltage doubler
M — Single-phase centre-tap
B — Single-phase bridge
S — Three-phase star
DB — Three-phase bridge
DS — Six-phase star
DSS — Six-phase star circuit with interphase transformer

A stack with the designation B 150/120-12, for example, consists of 4 × 6 = 24 plates 63 × 100 mm (25V).

Stacks incorporating parallel paths, i.e. two or more plates in parallel in each arm, are designated by a figure for the number of parallel paths at the beginning of the type code, e.g. 3B25/20—54. the figure 3 indicating three parallel paths in each arm. The total output current is given in the code. Thus in the example, the bridge total output current is 54A, (i.e. 3 × 18A).

If a selenium assembly consists of more than one stack, each stack is designated by the code for the complete assembly but prefixed with the relevant fraction e.g.: 1/2B 150/120-12

Stacks with code letter UP remain unpainted.

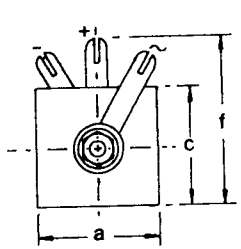
Stacks coated with a special varnish for use under tropical conditions can be supplied at an extra charge.

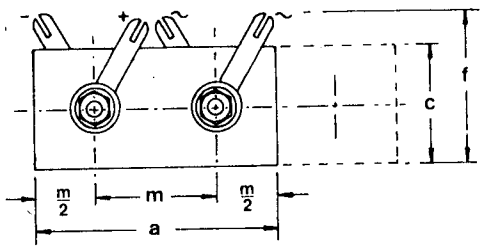
The terminals of the rectifier stacks are distinctively marked:
yellow or ~ indicates a.c. input
red or + indicates positive d.c. output terminal
blue or − indicates negative d.c. output terminal

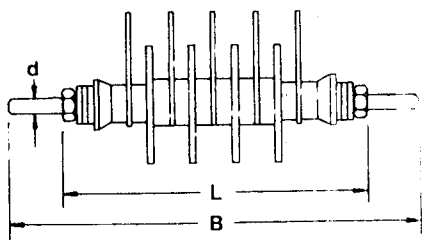
# Dimensions of Rectifier Stacks (in mm) for Natural Cooling

| Plate size | 20 × 20 | | 25 × 25 | | 33 × 33, 33 × 50, 50 × 50, 50 × 83, 50 × 100 | | | | | 63 × 100, | 83 × 100, | 100 × 100, | 100 × 125, | 100 × 200, | 100 × 250, | 100 × 300, | 100 × 375, | 100 × 400, | 100 × 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIM c | 20 | | 25 | | 33 | 33 | 50 | 50 | 50 | 63 | 83 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| DIM a | 20 | | 25 | | 33 | 50 | 50 | 83 | 100 | 100 | 100 | 100 | 125 | 200 | 250 | 300 | 375 | 400 | 500 |
| Spindle d | M4 | | M4 | | M5 | M5 | M5 | M5 | M5 | M8 | M8 | M8 | M8 | M8 | M8 | M8 | M8 | M8 | M8 |
| Spindle no. | 1 | | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| DIM m | — | | — | | — | — | — | — | — | — | — | — | — | 100 | 125 | 100 | 125 | 100 | 125 |
| DIM f | 32 | | 39 | | 39 | 52 | 68 | 68 | 68 | 91 | 103 | 135 | 135 | 142 | 142 | 142 | 142 | 142 | 142 |
| No. of plates | L | B | L | B | L | | B | | | L | | | | B | | | | | |
| 1 | 21 | 31 | 21 | 31 | 30 | | 39 | | | 44 | | | | 75 | | | | | |
| 2 | 26 | 36 | 26 | 36 | 38 | | 49 | | | 57 | | | | 85 | | | | | |
| 3 | 30 | 40 | 31 | 41 | 46 | | 54 | | | ① 70 | | | | ① 100 | | | | | |
| 4 | 37 | 47 | 37 | 47 | 54 | | 64 | | | 83 | | | | 115 | | | | | |
| 5 | 40 | 57 | 41 | 58 | 63 | | 85 | | | 96 | | | | 125 | | | | | |
| 6 | 43 | 60 | 47 | 64 | 71 | | 95 | | | ① 109 | | | | ① 140 | | | | | |
| 7 | 48 | 65 | 50 | 67 | 79 | | 100 | | | 122 | | | | 150 | | | | | |
| 8 | 54 | 71 | 56 | 73 | 87 | | 110 | | | 135 | | | | 165 | | | | | |
| 9 | 57 | 74 | 60 | 77 | 96 | | 120 | | | ② 148 | | | | ② 180 | | | | | |
| 10 | 61 | 78 | 65 | 82 | 104 | | 125 | | | 161 | | | | 190 | | | | | |
| 11 | 66 | 83 | 70 | 87 | 112 | | 135 | | | 176 | | | | 205 | | | | | |
| 12 | 72 | 89 | 76 | 93 | 121 | | 145 | | | 189 | | | | 220 | | | | | |
| 13 | 75 | 92 | 80 | 97 | 129 | | 150 | | | 202 | | | | 230 | | | | | |
| 14 | 79 | 96 | 85 | 102 | 138 | | 160 | | | 215 | | | | 245 | | | | | |
| 15 | 84 | 101 | 90 | 107 | 146 | | 165 | | | ② 228 | | | | ② 260 | | | | | |
| 16 | 88 | 105 | 96 | 113 | 155 | | 175 | | | 241 | | | | 270 | | | | | |
| 17 | 92 | 109 | 100 | 117 | 163 | | 185 | | | 254 | | | | 285 | | | | | |
| 18 | 97 | 114 | 105 | 122 | 172 | | 195 | | | ① 267 | | | | ① 295 | | | | | |
| 19 | 101 | 118 | 110 | 127 | 180 | | 205 | | | 280 | | | | 310 | | | | | |
| 20 | 107 | 124 | 116 | 133 | 189 | | 210 | | | 293 | | | | 325 | | | | | |
| 21 | 111 | 128 | 120 | 137 | 197 | | 220 | | | ② 308 | | | | ② 340 | | | | | |
| 22 | 115 | 132 | 125 | 142 | 205 | | 230 | | | 321 | | | | 350 | | | | | |
| 23 | 119 | 136 | 130 | 147 | 214 | | 235 | | | 334 | | | | 365 | | | | | |
| 24 | 123 | 140 | 136 | 153 | 222 | | 245 | | | 347 | | | | 375 | | | | | |
| 25 | 127 | 145 | 140 | 158 | 232 | | 255 | | | 360 | | | | 390 | | | | | |
| 26 | 131 | 149 | 145 | 163 | 240 | | 265 | | | 373 | | | | 405 | | | | | |
| 27 | 135 | 153 | 150 | 168 | 248 | | 270 | | | ② 385 | | | | ② 415 | | | | | |
| 28 | 140 | 158 | 156 | 174 | 257 | | 280 | | | 399 | | | | 430 | | | | | |
| 29 | 144 | 162 | 160 | 178 | 265 | | 290 | | | 412 | | | | 440 | | | | | |
| 30 | 149 | 167 | 165 | 183 | 273 | | 295 | | | ① 425 | | | | ① 455 | | | | | |
| 31 | 154 | 172 | 170 | 188 | 281 | | 305 | | | 440 | | | | 470 | | | | | |
| 32 | 159 | 177 | 176 | 194 | 289 | | 310 | | | 453 | | | | 485 | | | | | |
| 33 | 163 | 181 | 180 | 198 | 298 | | 320 | | | ② 466 | | | | ② 495 | | | | | |
| 34 | 167 | 185 | 185 | 203 | 306 | | 330 | | | 479 | | | | 510 | | | | | |
| 35 | 172 | 190 | 190 | 208 | 314 | | 335 | | | 492 | | | | 520 | | | | | |
| 36 | 176 | 194 | 196 | 214 | 322 | | 345 | | | 505 | | | | 535 | | | | | |

1 With circuits DS and DSS, dimensions L and B will be increased by 10mm. 2 With circuit S dimensions L and B will be increased by 10mm.



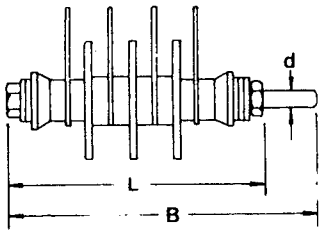




**Outline Drawings**

**Tolerances for L & B**
**1-12 plates + 3mm**
**13-24 plates + 4mm**
**25-36 plates + 6mm**

All rectifiers up to 4 plates have bolt assembly for plate sizes up to 50 × 100



# Selenium Rectifiers

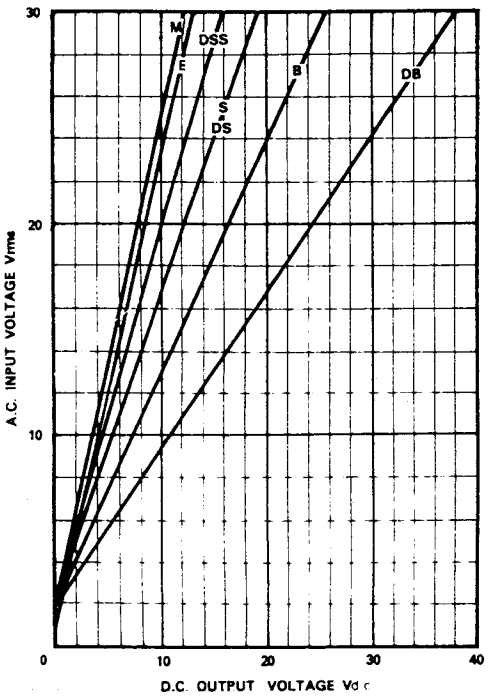



Fig. 1 INPUT VOLTAGE/OUTPUT VOLTAGE PER SERIES PLATE AT RATED CURRENT SEE RATING TABLE

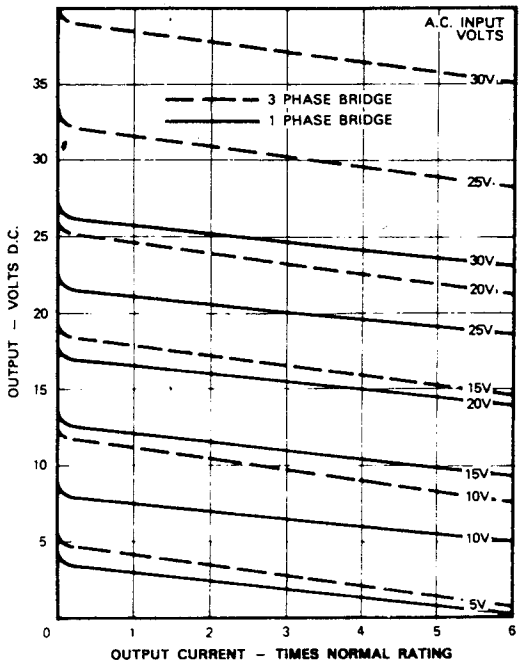



FIG 2 OUTPUT VOLTAGE/OUTPUT CURRENT PER SERIES PLATE

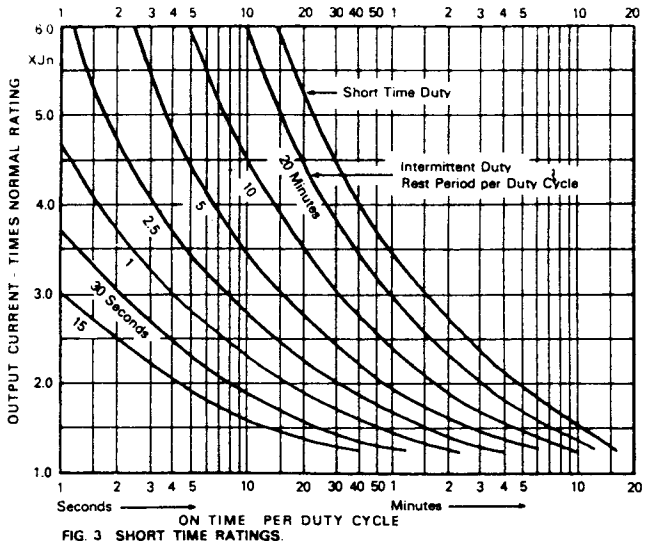



FIG. 3 SHORT TIME RATINGS.

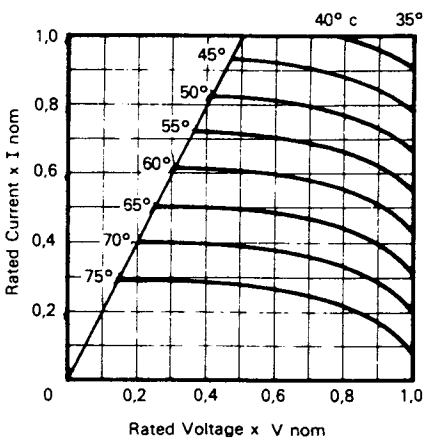



FIG. 4 AMBIENT TEMPERATURE DERATINGS

When operating the rectifiers in altitudes of more than 1000 metres above sea level, the cooling efficiency is reduced because of the rarified atmosphere.
The current should be derated as follows.

| Altitude M | Output % of Rated Current |
|---|---|
| Up to 1000 | 100 |
| 2000 | 91 |
| 3000 | 87 |
| 4000 | 82 |
| 5000 | 79 |

The policy of the Company is one of continuous improvement and we reserve the right to change specifications without notice.

**G D RECTIFIERS LTD** Tel: (0444) 243452 Fax: (0444) 870722