|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tag | Stus | Bus | Cod | Type | Characteristic | Rating | Connection | Trim Form | Bonnet | Body | Plug | Seat Ring | Guide | Stem | Packing | Gasket | RatedCV |
| PV-1006 | FLC | FF | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A216WCB | SUS316STL | SUS316STL | SCS14AHCR | SUS316 | TFEFIBER | T/#1806GR | 616 |
| PV-1011 | FC | FF | 510D | Globe | Linear | 600 | RF | MULTI-STEP PLUG, BLANCE TYPEMSCGV | STD | A216WCB | SUS 316/HCR+SS | SUS 316 /SS | SUS 316 | SUS 316 | TFEFIBER | T/#1806GR | 18.82 |
| PV-1045 | FC | H. T | 550G | Globe | Linear | 600 | RF | BalncedMultiHoleCage | FINEXT. | A216WCB | SUS410HT | SUS410HT | SUS410HT | SUS316 | GRAFOIL | T/#1806G | 196.1 |
| PV-2015 | FC | FF | 501G | Globe | Linear | 600 | RF | BalncedCGV | FINEXT. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | GRAFOIL | T/#1806G | 117 |
| USV-2038 | FC | 24VDC | 501G |  | Linear | 600 | RF | Balnced | FINEXT. | A351CF8C | SUS321/STL | SUS321/STL | SUS321/HCR | SUS321 | GRAFOIL | T/#1808G | 215 |
| FV-2040 | FO | H. T | 501G | Globe | EQ% | 600 | RF | BalncedCGV | FINEXT. | A351CF8C | SUS321SS | SUS321SS | SUS321HCR | SUS321 | GRAFOIL | T/#1808G | 16 |
| PV-2073 | FC | FF | 550G | Globe | Linear | 600 | RF | BalncedMULTI HOLE CAGE | FINEXT. | A216-WCB | SUS 410 /HT | SUS 410 /HT | SUS 410 /HT | SUS316 | GRAFOIL | T/#1806G | 387 |
| FV-2072 | FO | H. T | 501G | Globe | EQ% | 600 | RF | BalncedCGV | FINEXT. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | GRAFOIL | T/#1806G | 209 |
| FV-2091 | FC | FF | 501G | Globe | EQ% | 600 | RF | BalncedCGV | FINEXT. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | GRAFOIL | T/#1806G | 879 |
| FV-2061 | FC | H.T | R2.2 | Butterfly | Approximate EQ% | 600 | RF | TRIPLE ECENRIC | STD | A216WCB | A351CF8M/ENP+STL | SUS 316 STL | SUS316HCR | Inc. | GRAFOIL | ------ | 4648.2 |
| USV-2094 | FO | 24VDC | 501T | Globe | EQ% | 600 | RF | UnbalncSS | FINEXT | A105 | SUS316/STL | SUS316/STL | SUS440C/HT | SUS316 | GRAFOIL | T/#1890-S | 13 |
| HV-2097 | FC | FF | 510D | Globe | Linear | 600 | RF | BalncedMULTI STAGE CAGEOVER | FINEXT. | A216WCB | SUS410HT | SUS410HT | 410 SS /HT | SUS 316 | GRAFOIL | T/#1806G | 7 |
| FV-2079 | FO | H. T | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A105 | SUS410/HT | SUS410/HT | SCS24/PH | SUS316 | GRAFOIL | T/#1806G | 7.4 |
| FV-2233 1 | FC | FF | 501T | Globe | Linear | 900 | RTJ | UnbalncSS | STD | SUSF 304L | SUS 316/ STL | SUS 316/ STL | SUS 316PS | SUS 316 | TFEFIBER | T/#1808G | 7.2 |
| FV-2233 2 | FC | FF | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A105 | SUS410/HT | SUS410/HT | SCS24/PH | SUS 316 | TFEFIBER | T/#1806G | 9.64 |
| LV-2372 | FLC | H. T | 501G | Globe | EQ% | 1500 | RTJ | BalncedCGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS 24 /PH | SUS 316 | TFEFIBER | T/# 1806G | 48.8 |
| FV-2417 | FLC | H. T | 501G | Globe | EQ% | 1500 | RTJ | BalncedCGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS24/PH | SUS 316 | TFEFIBER | T/#1806G | 209 |
| LV-2403 | FC | FF | 501G | Globe | Linear | 900 | RTJ | BalncedCGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | GRAFOIL | T/# 1806G | 29 |
| LV-2419 | FC | FF | 501G | Globe | Linear | 600 | RF | BalncedCGV | STD | A351CF8 | SUS 316 | SUS 316 | SCS14AHCR | SUS 316 | GRAFOIL | T/#1806G | 103.8 |
| PV-2406 | FC | FF | 501G | Globe | Linear | 300 | RF | BalncedCGV | STD | A351CF8 | SUS 316STL | SUS 316STL | SCS14AHCR | SUS 316 | GRAFOIL | T/#1806G | 913 |
| LV-2441 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | BalncedCGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | GRAFOIL | T/#1806G | 108 |
| TV-2457 | FC | FF | 710E | Butterfly | Approximate EQ% | 300 | Wafer | EcentricHPBV | STD | A351CF8 | A351CF8MPS | SUS 316PSHG Type | SUS 316Hcr | SUS 630PH | GRAFOIL | ------- | 3008 |
| LV-2474 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | BalncedCGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | TFEFIBER | T/#1806G | 25.4 |
| PV-2481 | FC |  | 501G | Globe | Linear | 300 | RF | Balnced | STD | A351CF8 | SUS 316STL | SUS 316STL | SCS14AHCR | SUS 316 | TFEFIBER | T/#1806G | 1050 |
| FV-2531 1 | FC | FF | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A216-WCB | SUS 316 | SUS 316STL | SUS440CHT | SUS 316 | TFEFIBER | T/#1890S | 110 |
| FV-2531 2 | FC | FF | 501G | Globe | EQ% | 300 | RF | Balnced | STD | A216-WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 650 |
| FV-2536A | FC | FF | 501G | Globe | Linear | 300 | RF | BalncedCGV | STD | A216-WCB | SUS 410 /HT | SUS 410 /HT | SCS24/PH | SUS316 | TFEFIBER | T/#1806G | 820 |
| PV-2536B | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced | STD | A216-WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 1050 |
| PV-2608 | FC | FF | 501T | Globe | Linear | 900 | RTJ | UnbalncSS | STD | A105 | SUS 440C/HT | SUS 440C/HT | SUS 440C/HT | SUS 316 | TFEFIBER | T/#1806G | 3.46 |
| HV-3011 | FC | FF | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A351CF3 | SUS 316STL | SUS 316STL | SUS 316PS | SUS 316 | TFEFIBER | T/#1890-316 | 16 |
| PV-3042 | FLC | H. T | 730E | Butterfly | Approximate EQ% | 600 | RF | TRIPLE ECENRIC | STD | A216WCB | A351CF8M/ENP | SUS 316 /PS | SUS 316 /Hcr | Inc. | GRAFOIL | ------ | 4406 |
| FV-3041 | FLC | H. T | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS24/PH | SUS 316 | TFEFIBER | T/#1806G | 9.7 |
| LV-3161A | FC | H. T | 510D | Globe | Linear | 900 | RTJ | BalncedOVER PLUG FLOWMSCGV | STD | A351CF8 | SUS 316 /SS | SUS 316 /STL | SUS 316 | SUS 316 | TFE FIBER | T/# 1806G | 65 |
| LV-3161B | FC | H. T | 510D | Globe | Linear | 900 | RTJ | BalncedOVER PLUG FLOWMSCGV | STD | A351CF8 | SUS 316 /SS | SUS 316 /STL | SUS 316 | SUS 316 | TFE FIBER | T/# 1806G | 65 |
| PV-3166 | FO | FF | 501G | Globe | Linear | 900 | RTJ | BalncedCGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | TFE FIBER | T/# 1806G | 66.1 |
| FV-3171 | FC | FF | 501G | Globe | Linear | 900 | RTJ | BalncedCGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS 24 /PH | SUS 316 | TFE FIBER | T/# 1806G | 289 |
| FV-3169 | FC | FF | 510D | Globe | Linear | 900 | RTJ | BalncedMULTI STEP PLUGMSCGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | 410 SS /HT | SUS 316 | TFE FIBER | T/# 1806G | 34 |
| LV-3192 | FC | H. T | 501G | Globe | EQ% | 150 | RF | BalncedCGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | TFE FIBER | T/# 1806G | 540 |
| FV-5020 | FC | FF | 501T | Globe | EQ% | 300 | RF | UnbalncSS | STD | A105 | SUS316 | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 9.55 |
| FV-5041 | FC | FF | 501G | Globe | EQ% | 150 | RF | Balnced | STD | A351CF8 | SUS316STL | SUS316STL | SCS 14AHCR | SUS316 | TFEFIBER | T/#1806G | 320 |
| TV-5064 | FC | FF | 710E | Butterfly | Approximate EQ% | 300 | Wafer | EcentricHPBV | STD | A351CF8 | A351CF8MPS | SUS316PSHG TyPE | SUS316HCR | SUS630PH | GRAFOIL | --- | 3952 |
| PV-5069 | FC | FF | 501G | Globe | Linear | 300 | RF | BalncedCGV | FINEXTN. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | GRAFOIL | T/#1806G | 408 |
| FV-5093 | FC | H. T | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 148 |
| FV-5107 | FC | FF | 501T | Globe | EQ% | 300 | RF | UnbalncSS |  | A105 | SUS316 | SUS316/STL | SUS440C/HT | SUS316 | TFE FIBER | T/#1890-S | 1.17 |
| FV-5161 | FC | FF | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 327 |
| PV-5091A | FC | H. T | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A216WCB | SUS316STL | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 8 |
| PV-5091B | FC | H. T | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A216WCB | SUS316 | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 66 |
| PV-5109 | FC | FF | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A216WCB | SUS316 | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 121 |
| FV-5203 | FC | H. T | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 320 |
| PV-5207A | FO | H. T | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A105 | SUS316STL | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 4 |
| PV-5207B | FC | H. T | 501T | Globe | EQ% | 300 | RF | UnbalncSS | STD | A216WCB | SUS316 | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 38 |
| FV-5239 | FC | FF | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 155 |
| FV-5441 | FC | FF | 501T | Globe | EQ% | 300 | RF | UnbalncSS | STD | A105 | SUS440CHT | SUS440CHT | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 3.53 |
| FV-5321 | FC | H. T | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 492 |
| FV-5336 | FC | FF | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G |  48 |
| FV-5337 | FC | FF | 501G | Globe | EQ% | 300 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 162 |
| HV-5338 | FC | FF | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A105 | SUS316 | SUS316STL | SUS440CHT | SUS316 | TFEFIBER | T/#1890S | 15 |
| FV-5367 | FC | FF | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 13.8 |
| FV-5383 | FC | FF | 501T | Globe | EQ% | 150 | RF | UnbalncSS | STD | SUSF304 | SUS316 | SUS316 | SUS316PS | SUS316 | TFEFIBER | T/#1890-316 | 8.3 |
| FV-5407A | FC | FF | 510D | Globe | Linear | 600 | RF | BLANC TYPE OVER PLUG FLOWMSCGV | STD | A105 | SUS410/HT | SUS410/HT | 410 SS/HT | SUS316 | TFE FIBER | T/#1806G | 1.43 |
| FV-6031 | FC | FF | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 29 |
| PV-6025 | FC | H. T | 720C | Butterfly | Approximate EQ% | 600 | RF | EcentricHPBV | STD | A216-WCB | A351CF8M/PS | SUS630/PHHG Type | SUS316/Hcr | Inc. | GRAFOIL | --- | 3272 |
| FV-6070 | FC | H. T | 501G | Globe | EQ% | 600 | RF | BalncedCGV | FINEXTN. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS316 | GRAFOIL | T/#1806G | 665.4 |
| FV-6059 1 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | BalncedCGV | STD | A351CF8 | SUS316/STL | SUS316/STL | SUS316/HCR | SUS316 | GRAFOIL | T/#1806G | 40 |
| LV-6051 | FC | FF | 720C | Butterfly | Approximate EQ% | 900 | RTJ | EcentricHPBV | STD | A351CF8 | A351CF8M/PS | SUS316/PS | SUS316/Hcr | SUS630/PH | GRAFOIL | ---- | 2117 |
| FV-6081 | FC | FF | 510D | Globe | Linear | 1500 | RTJ | UnblnceTYPE OVER PLUG FLOWMSCGV | STD | SUSF304L | SUS316/HCR+SS | SUS316/SS | SUS316 | SUS316 | TFE FIBER | T/#1806G | 1.12 |
| FV-6086 | FC | FF | 510D | Globe | Linear | 900 | RTJ | BalnceTYPE OVER PLUG FLOWMSCGV | FINEXTN. | A351CF8 | SUS316/HCR+SS | SUS316/SS | SUS316 | SUS316 | GRAFOIL | T/#1806G | 14.5 |
| USV-6082 | FC |  | S1.2 | Butterfly |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FV-6082 | FC | FF | 501T | Globe | Linear | 150 | RF | UnbalncSS | STD | A351CF8 | SUS316STL | SUS316STL | SUS316PS | SUS316 | TFEFIBER | T/#1890-316 | 7.2 |
| LV-6082 | FC | FF | 501T | Globe | Linear | 150 | RF | UnbalncSS | STD | A351CF8 | SUS316STL | SUS316STL | SUS316PS | SUS316 | TFEFIBER | T/#1890-316 | 27 |
| PV-7002A | FLO | FF |  | Globe | Linear | 1500 |  | Multi FlowOverBalnced | Normalising | A217WC6 | 316STST+Stelit | 316STST+Stelit | 420ST.ST | AG38 | GRAFOIL | 316ST.STGraphit | 46.623.3 |
| PV-7002B | FLO | FF |  | Globe | Linear | 1500 |  | Multi FlowOverBalnced | Normalising | A217WC6 | 316STST+Stelit | 316STST+Stelit | 420ST.ST | AG38 | GRAFOIL | 316ST.STGraphit | 467407 |
| PV-7002C | FLO | FF |  | Globe | Linear | 1500 |  | Multi FlowOverBalnced | Normalising | A217WC6 | 316STST+Stelit | 316STST+Stelit | 420ST.ST | AG38 | GRAFOIL | 316ST.STGraphit | 467407 |
| PV-7004 | FC | FF | 510D | Globe | Linear | 600 | RF | Balncedover plug flowMSCGV | FINEXTN. | A216WCB | SUS410/HT | SUS410/HT | 410SS/HT | SUS316 | GRAFOIL | T/#1806G | 930 |
| TV-7002 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 0.39 |
| TV-7003 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 3.96 |
| TV-7004 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410NiMo |  |  |  | Graphit |  | 3.96 |
| PV-7025A | FLO | FF |  | Globe | Linear | 1500 |  | Multi FlowOverBalnced | Normalising | A217WC6 | 316STST+Stelit | 316STST+Stelit | 420ST.ST | A636 | GRAFOIL | 316ST.STGraphit | 134116 |
| PV-7025B | FLO | FF |  | Globe | Linear | 1500 |  | Multi FlowOverBalnced | Normalising | A217WC6 | 316STST+Stelit | 316STST+Stelit | 420ST.ST | A636 | GRAFOIL | 316ST.STGraphit | 134116 |
| TV-7026 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 0.51 |
| TV-7027 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 0.51 |
| PV-7028 | FC | FF | 720C | Butterfly | Approximate EQ% | 600 | RF | EcentricHPBV | STD | A217WC6 | A351CF8M/PS | SUS316/PS HG | SUS316/Hcr | Inc. | GRAFOIL | --- | 2702 |
| TV-7025A | FC | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 7.8 |
| TV-7025B | FC | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 7.8 |
| PV-7031A | FLO | FF |  | Globe | Linear | 600 | RF | Multi FlowOverBalnced | Normalising | A216WCB | 316LSTST+Stelit | 316LSTST+Stelit | 420ST.ST | A636 | GRAFOIL | 316LST.STGraphit | 829619 |
| PV-7031B | FLO | FF |  | Globe | Linear | 600 | RF | Multi FlowOverBalnced | Normalising | A216WCB | 316LSTST+Stelit | 316LSTST+Stelit | 420ST.ST | A636 | GRAFOIL | 316LST.STGraphit | 829619 |
| PV-7031C | FLO | FF |  | Globe | Linear | 600 | RF | Multi FlowOverBalnced | STD | A216WCB | 316LSTST+Stelit | 316LSTST+Stelit | 420ST.ST | A636 | GRAFOIL | 316LST.STGraphit | 11163 |
| PV-7031D | FLO | FF |  | Globe | Linear | 600 | RF | Multi FlowOverBalnced | STD | A216WCB | 316LSTST+Stelit | 316LSTST+Stelit | 420ST.ST | A636 | GRAFOIL | 316LST.STGraphit | 11163 |
| TV-7032 | FLO | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 6.6 |
| TV-7033 | FLO | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 6.6 |
| PV-7051A |  |  |  | Globe | Linear | 600 | RF | CascadeUnderBalnced | Normalising | A216WCB | 316LSTST+Stelit | 316LSTST+Stelit | 420ST.ST | A636 | GRAFOIL | 316LST.STGraphit | 238182 |
| PV-7051B |  |  |  | Globe | Linear | 600 | RF | CascadeUnderBalnced | Normalising | A216WCB | 316LSTST+Stelit | 316LSTST+Stelit | 420ST.ST | A636 | GRAFOIL | 316LST.STGraphit | 238182 |
| TV-7052 |  |  |  |  |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 2.6 |
| TV-7053 |  |  |  |  |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 2.6 |
| PV-7034 | FC | FF | 510D | Globe | Linear | 600 | RF | Balncedover plug flowMSCGV | FINEXTN. | A216WCB | SUS410/HT | SUS410/HT | 410SS/HT | SUS316 | GRAFOIL | T/#1806G | 703 |
| TV-7071A | FC | FF |  | Angle |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 0.6 |
| TV-7071B | FC | FF |  | Angle |  | 600 | RF |  |  | A182 F11 | ER 410NiMo |  |  | AISI431 | Graphit |  | 0.6 |
| FV-5301 | FC | FF | 501G | Globe | Linear | 300 | RF | BalncedCGV | STD | A217WC9 | SUS410HT | SUS410HT | SCS24PH | SUS316 | TFEFIBER | T/#1806G | 320 |
| FV-7091 | FLC | FF | 501G | Globe | EQ% | 150 | RF | BalncedCGV | STD | A351CF8 | SUS316STL | SUS316STL | SCS14AHCR | SUS316 | TFEFIBER | T/#1806G | 114.5 |
| PV-7056 | FC | FF | 501G | Globe | Linear | 300 | RF | BalncedCGV | FINEXTN. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS630PH | GRAFOIL | T/#1806G | 2587 |
| PV-7101 | FC | FF | 501G | Globe | Linear | 300 | RF | BalncedCGV | FINEXTN. | A216WCB | SUS410HT | SUS410HT | SCS24PH | SUS630PH | GRAFOIL | T/#1806G | 2774 |
| FV-2150 | FC | H. T | 501G | Globe | EQ% | 600 | RF | BalncedCGV | STD | A216WCB | SUS410/HT | SUS410/HT | SCS24/PH | SUS316 | GRAFOIL | T/#1806G | 19.6 |
| HV-2031 | FC | FF | 550G | Globe | Linear | 600 | RF |  BalncedMultiHoleCageOver | FINEXTN. | SUSF 321 |   SUS321HCR +SS |   SUS321SS |  SUS321HCR |  SUS321 | GRAFOIL | T/#1808G | 6 |
| LV-6021A | FC | FF | 501G | Globe | EQ% | 600 | RF | BalncedCGV5070 |  FINEXTN. | A216WCB | SUS410/HT | SUS410/HT | SCS24/PH | SUS316 | GRAFOIL | T/#1806G | 334 |
| LV-6021B | FC | FF | 550G | Globe | EQ% | 600 | RF | BalncedMHCGV |  FINEXTN. | A216WCB | SUS410/HT | SUS410/HT | SUS410/HT | SUS316 | GRAFOIL | T/#1806G | 156 |
| LV-5070 | FC | FF | 501T | Globe | EQ% | 300 | RF | UnbalncSS | STD | A217WC9 | SUS440C/HT | SUS440C/HT | SUS440C/HT | SUS316 | TFEFIBER | T/#1890S | 23.65 |
| PV-2361 | FLC | FF | 510D | Globe | Linear | 1500 | RTJ | BalncedMULTI STEP PLUGMSCGV |  FINEXTN. | A217WC6 | Inc. | Inc. | Inc. | SUS316 | GRAFOIL | T/#1806G | 114 |
| PV-2363 | FLO | H. T | 720C | Butterfly | Approximate EQ% | 1500 | RTJ | EcentricHPBV | STD | A217WC6 | A351CF8M/PS | SUS 316 /PS HG | SUS 316 /Hcr | Inc. | GRAFOIL | ------ | 4414 |
| LV-2016 | FC | H. T | 510D | Globe | Linear | 600 | RF | Balncedover plug flowMSCGV | FINEXTN. | A217WC9 | SUS410/HT | SUS410/HT | 410SS/HT | SUS316 | GRAFOIL | T/#1806G | 4.78 |
| HV-2371 | FC | FF | 510D | Globe | Linear | 900 | RTJ | Balncedover plug flowMSCGV | FINEXTN. | A217WC9 | SUS410/HT | SUS410/HT | 410SS/HT | SUS316 | GRAFOIL | T/#1806G | 14 |
| FV-7141 | FC | FF | 510D | Globe | Linear | 1500 | RTJ | Balncedover plug flowMSCGV | STD | A216WCB | SUS410/HT | SUS410/HT | 410SS/HT | SUS316 | TFE FIBER | T/#1806G | 39.6 |
| TV-2220 | FLO | FF | 720C | Butterfly | Approximate EQ% | 600 | RF | EcentricHPBV | STD | A216WCB | A351CF8M/PS | SUS630/PH | SUS316 /Hcr | SUS630/PH | TFE FIBER | ------ | 501 |
| FV-6059 2 | FC | FF | 501G | Globe | Linear | 600 | RF | Balnced | STD | A216WCB | SUS410/HT | SUS410/HT | SCS24/PH | SUS316 | TFE FIBER | T/#1806G | 17.5 |
| FV-6059 1 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | BalncedCGV | STD | A351CF8 | SUS316/STL | SUS316/STL | SUS316/HCR | SUS316 | GRAFOIL | T/#1806G | 40 |
| HV-0511 | FC | FF | 501T | Globe | EQ% | 150 | RF | UnbalncSS | STD | A216WCB | SUS316 | SUS316/STL | SUS440C/HT | SUS316 | TFE FIBER | T/#1890-S | 87.7 |
| LV-0511 | FC | FF | 501G | Butterfly | Linear | 300 | RF | UnbalncHPBV | STD | A351CF8 | SUS316/STL | SUS316/STL | SUS316/HCR | SUS316 | TFE FIBER | T/#1806GR | 142 |
| USV-2041 | FC | 24VDC | 501G | Globe | Linear | 600 | RF | BalncedCGV | FINEXTN. | A351CF8C | SUS321/STL | SUS321/STL | SUS321/HCR | SUS321 | GRAFOIL | T/#1808G | 70 |
| LV-7251 | FC | FF | 501T | Globe | Linear | 300 | RF | UnbalncSS | STD | A217WC9 | SUS316/STL | SUS316/STL | SUS440C/HT | SUS316 | TFE FIBER | T/#1890-S | 7.4 |
| PV-3194 | FC | FF | 501G | Globe | EQ% | 150 | RF | BalncedCGV | STD | A351CF8 | SUS 316 | SUS 316 | SCS 14AHCR | SUS 316 | TFEFIBER | T/#1806G | 167 |
| TV-5277 | FC | FF | 710E | Butterfly | ApproximateEQ% | 300 | Wafer | EcentricHPBV | STD | A351CF8 | A351CF8MPS | SUS 316PSHG TYPE | SUS 316HCR | SUS630PH | GRAFOIL |  | 4117 |

1. Control valves shall have removable trims and sufficient clearance shall be allowed for access and removal.
2. Where cage guided control valves are specified, balanced trim should be considered for large sized valves.
3. For globe body control valves, the trim construction shall be either single-seated with heavy duty top guiding for

 the plug, Double-seated with top and bottom guiding for the plug, or cage type. For liquid services with a high pressure

 drop i.e., (boiler feed water), and gas service (pressure let down), cage trims shall be specified to have the plug supported

 at the critical area.

1. Balance type control valve in place of single seat valve in high pressure service shall be considered.
2. For oxygen services, body and trim materials shall be AISI-316 stainless steel. Body casting shall internally be

 completely machined to a smooth surface to remove any casting imperfections.

1. The minimum requirement for the body material is that the valve shall have a cast steel body, and the trim, consist

 of plug, seat ring and stem, shall have stainless steel 316, unless otherwise specified by the nature of process fluid being

 handled and/or requested through relevant data sheet.

1. Small-sized valves for erosive services shall have their plug and seat rings made for solid satellite No. 6. For

 economical reasons hardened stainless steel 440°C may be used as trim material if this is suitable for the particular process

 conditions.

1. When valves are used for sour gas services the trim and bolting material construction shall comply with the recommendation

 of National Association of Corrosion Engineers (NACE) MR-01-75 latest revision.

1. Guide bushing shall be a corrosion resistant material. It is preferred that the guide bushing material be a minimum

 of 125 brinnel harder than the trim, i.e., 17-4 PH (Precipitation Hardened) stainless steels or better.

1. Butterfly valves trim material shall be suitable for specified service conditions and compatible with the piping

 material.

1. Butterfly valves trim material including disks, shafts, bushings, body and/or disk seating surfaces, internal keys

 and pins and screws when in contact with the contained fluid shall be selected from Table 1, if not specified in data

 sheet.

1. A control valve consist of two major sub-assemblies, a valve body sub-assembly and an actuator. The valve body

 sub-assembly is the portion that actually controls the passing fluid. It consist of a housing, internal trim, bonnet and

 sometimes a bottom flange.

1. Top entry or cage guided valves have the advantages of easy trim removal. Valves of this type usually have stream lined

 body passages to permit increased flow capacity.

1. For services at high pressure drops, the application of a conventional valve trim often results in very high fluid velocities

and unacceptable high noise levels.

1. Where this would be the case, the fluid velocity must be controlled by using a valve trim having specially designed

 multiple orifices in series and/or in parallel, or having a tortuous path forcing the fluid to change the direction continuously,

 causing high turbulence friction.

1. Where control valves with a very low capacity factor (CV) are required, these may be of the miniature valve type with

 flanged or threaded connections and a needle trim.

**TABLE 1 - BASIC MATERIALS FOR BUTTERFLY VALVES**

|  |  |  |
| --- | --- | --- |
| **1** | **2** | **3** |
| COMPONENT | MATERIAL | BS REFERENCE |
| Body | Cast iron | 1452 |
| Body with integral seat | Austenitic cast iron | 3468 |
| Disk |  |  |
| Spheroidal graphite iron | 2789 |
| HandwheelDisk with integral seatRings fitted to body or disk for sealing, seating, or rataining purposes |
| Carbon steel | 1501.1511503.2211504.161 |
|  | Stainless steel | 1501: Part 3 |
|  |  | 1503 |
|  |  | 1504, 3100 |
|  |  | 1504 |
|  | Gunmetal | 1400 |
|  | Aluminum bronze | 1400 |
|  | Rings of deposited metal or resilient + material |
| Shaft | Carbon steel | 970: Part 1 |
| Stainless steel | 970: Part 4 |
| Aluminum bronze | 2672 or 2874 |
| Nickel copper alloy | 3076 |
| Shaft bearings seals (when fitted) | No requirement in this Standard |
| Internal fastenings | Carbon steel |  |
| Stainless steel |
| Phosphor bronze | 2870, 2873 |
| Aluminum bronze | 2872, 2874, 2875 |
| Nickel copper alloy | 3076 |

1. The minimum globe control valve body size to be used shall be 1 inch screwed, unless flange type is specified,

 and the internal trim size shall be in accordance to the requirements as specified in data sheet.

1. Body sizes smaller than 1 inch may be used for special applications, and pressure regulation services. For valve

 sizes smaller than 1 inch, reduced trim in 1 inch size bodies normally will be preferable.

1. Control valves with inherent high pressure-recovery characteristics can cause cavitation when fluid pressure and

 temperature conditions would indicate. Valves with low pressure recovery, special trim should be used to minimize or

 prevent cavitation.

1. Control valve flow characteristics are determined principally by the design of the valve trim. The three inherent characteristics

 available are quick opening, linear, and equal percentage. These are shown in Fig. 18. A modified percentage

 characteristic generally falling between the linear and equal percentage characteristics is also available.

1. Linear trim provides equal increases in CV for equal increases in stem travel. Thus the CV increase is linear with

 plug position throughout its travel.

1. Equal percentage trim provides equal percentage increases in CV for equal increments of stem travel. This is accomplished

 by providing a very small opening for plug travel near the seat and very large increases toward the

 more open position. As a result, a wide rangeability of CV is achieved.

1. Characteristic of the inner valve shall normally be equal percentage except where system characteristics indicate

 otherwise. Linear and quick opening characteristics shall be used where required. In general linear trim shall be used

 only for Split-Range service or where control valve pressure drop remains constant over the range of 10% to 100% of

 flow capacity.

1. Oversized bodies with reduced trims shall be used for valves in severe flashing or cavitating service. Angle

 type or multiple seat type valves may be considered for this service.

1. Stainless steel trim valves are recommended on installation having pressure over 35 bar.
2. The internal parts of a valve which are in flowing contact with the controlled fluid. Examples are the plug, seat ring,

 cage, stem and the parts used to attach the stem to the plug. The body, bonnet, bottom flange, guide means and gaskets

 are not considered as part of the trim.

1. Anti-Noise trim: A combination of plug and seat ring or plug and cage that by its geometry reduces the noise generated by fluid flowing

Through the valve.

1. Anti-Cavitation trim: A combination of plug and seat ring or plug and cage that by its geometry permits non-cavitating operation or reduces

the tendency to cavitate, thereby minimizing damage to the valve parts, and the downstream piping.

1. Balanced trim: An arrangement of ports and plug or combination of plug, cage, seals, and ports that tends to equalize the pressure

 above and below the valve plug to minimize the net static and dynamic fluid flow forces acting along the axis of the

 stem of a globe valve.

 30. Erosion resistant trim: Valve trim which has been faced with very hard material or manufactured from very hard material to resist the erosive

 effects of the controlled fluid flow.

1. Soft seated trim : Globe valve trim with an elastomeric, plastic or other readily deformable material used either in the valve plug or seat

 ring to provide tight shutoff with minimal actuator forces. See ANSI B16.104 for leakage classifications.

1. Ball valves may be considered for On-Off service and for large sizes on throttling service. Unless equipped with a special trim, i.e. anti-cavitation or

 low-noise design, ball valves should not be used on throttling services with a differential pressure of more than 10 bar.

1. The body size of a control valve in throttling service should have the same size as the calculated trim size, however oversized bodies may be required

 up to the size of the adjacent piping (for example, to reduce the outlet velocity).

1. TRIM**:** The term TRIM covers all those parts of the valve assembly that are in contact with the line medium consisting of, but not limited to, the seat ring

 plug, stem, plug guide bushing and cage.

1. The trim and particularly the seat ring(s) shall be of the easy/quick replaceable type. A bottom flange shall be provided for those valves that require access from

 the bottom, for trim removal. A bottom flange is not permitted on control valves on service below 0°C. In butt welding-end control valves the entire assembly of trim

 and seat shall be removable from the top. For valves that operate at high or low process temperatures, special attention shall be paid to the clearances between plug

 and guide bushing, and in addition for cage type trims to the clearance between plug and cage, in order to prevent the valve from sticking.

 For valves operating on fluids with a tendency towards coking, special attention shall be paid to the trim construction to prevent the valve from sticking. When ball

 valves are used on slurry services; they should be equipped with a scraper type of seat construction. For trims that are not of the one-piece plug type and stem

 assembly, the plug/stem construction shall be provided with a locking device to prevent accidental separation.

1. Trim components shall not be screwed or welded to the valve body for globe or cage style trim. They shall not be welded for eccentric style trim.

 The valve stem connection to the actuator stem shall be adjustable with positive locking of the adjustment. The trim for butterfly valves should be of the balanced

 type which can be used-up to the fully open position. The shaft and disc shall be capable of withstanding a pressure drop across the valve of at least 1.25 times the

 pressure drops in the closed position. For valve, operating on fluid that solidifies at ambient temperature, attention shall be paid that the fluid cannot

 penetrate the clearance between stem and bushing in order to prevent sticking of the stem after a plant shutdown.

1. When, after proper selection of the control valve and its location, cavitation is unavoidable, preference should be given to hardened trim materials. For

 single seated valves, a change in flow direction through the valve may, however already be sufficient. Where hardened trim materials and/or a

 change in flow direction are not adequate or feasible, valves with special anticavitation trims should be considered For applications, where anti-cavitation trims are

 not available, two valves in series may also be considered. This solution requires the COMPANY approval. The application of restriction orifice (s) downstream the

 control valve to reduce the pressure drop across the valve requires the COMPANY approval.

1. If the predicted noise level exceeds 85 dBA at 1 meter far from control valve, noise attenuating device shall be provided such as special trim, diffusers, resistance plates, in-line silencer, etc.
2. The trim shall, as a minimum, be of AISI 316 type stainless steel, unless other material is required for the process conditions. For fluids that become corrosive when in contact with the atmosphere, suitable trim materials shall be considered, or precautions to prevent contact with air shall be taken. Where soft (resilient) inserts are required for meeting the specified leakage rate, the inserts should preferably be of glass-fiber filled or graphite filled PTFE. The selection shall be based on the suitability for the specified process conditions. The resilient insert shall be properly clamped between metal parts and/or locked in position to prevent blow out in the closed position. Hardened stainless steel or stellited facing shall be supplied for valve plugs and guides with solid stellited seat rings for the following applications: ♦ erosive services, ♦ flashing, cavitation services, ♦ fluids above 315°C, ♦ wet gas or wet steam service with a pressure drop greater than 5 bar, ♦ When the pressure drop is greater than 10 bar at design conditions.
3. Depending upon design of the valve, an extension bonnet may be required to keep the temperature at the stuffing box to an acceptable value for the applied packing. An extension bonnet may also be required, when the operating differential pressure across the valve may cause freezing of the stuffing box/packing and/or ice formation on the trim. This may be the case, for instance, on compressor recycle (anti-surge) valves.
4. The handwheel operating force shall not exceed 350 N on the trim
5. In the air supply line of On/Off valve. In that case, care will be taken that the trim of solenoid valve is adequately sized according to the air supply.
6. The force required to operate a globe valve includes: Force to overcome static unbalance of the valve plug Force to provide a seat load Force to overcome packing friction Additional forces required for certain specific applications or constructions Total force required = A + B + C + D
7. The unbalance force is that resulting from fluid pressure at shutoff and in the most general sense can be expressed as: Unbalance force = net pressure differential X net unbalance area Frequent practice is to take the maximum upstream gauge pressure as the net pressure differential unless the process design always ensures a back pressure at the maximum inlet pressure. Net unbalance area is the port area on a single-seated, flow-up design. Unbalance area may have to take into account the stem area depending on configuration. For balanced valves there is still a small unbalance area. This data can be obtained from the manufacturer. Typical port areas for balance valves flow up and unbalanced valves in a flow down configuration are listed.



1. Packing friction is determined by stem size, packing type, and the amount of compressive load placed on the packing by the process or the bolting. Packing friction is not 100% repeatable in its friction characteristics. Live-loaded packing designs can have significant friction forces especially if graphite packing is used. The table lists typical packing friction values.
2. Additional forces may be required to stroke the valve such as: bellow stiffness; unusual frictional forces resulting from seals; or special seating forces for soft metal seals as an example. The manufacturer should either supply this information or take it into account when sizing an actuator.
3.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A216 WCB | A217 WC6 | A217 WC9 | A105 | A182 F11 | A351 CF8 | A351 CF3 | SUS F304 | SUS F304L | SUSF321 | A351 CF8C |
| PV-1006 PV-1011PV-1045PV-2015PV-2073FV-2072FV-2091FV-2061HV-2097LV-2372FV-2417PV-2531-1PV-2531-2FV-2536APV-2536BPV-3042FV-3041FV-3169FV-3171PV-5069FV-5093FV-5161PV-5091APV-5091BPV-5109FV-5203PV-5207BFV-5239FV-5321Fv-5336FV-5337FV-5367FV-6031PV-6025FV-6070PV-7031APV-7031BPV-7031CPV-7031DPV-7051APV-7051BPV-7034PV-7056PV-7101FV-2150LV-6021ALV-6021BFV-7141TV-2220FV-6059-2HV-0511 | PV-7002APV-7002BPV-7002CPV-7025APV-7025BPV-7028LV-5070PV-2361PV-2363 | FV-5301FV-5070LV-2016HV-2371LV-7251 | USV-2094FV-2079FV-2233 2PV-2608FV-5020FV-5107PV-5207AFV-5441FV-5338FV-5407 | TV-7002TV-7003TV-7004TV-7026TV-7027TV-7025ATV-7025BTV-7032TV-7033TV-7052TV-7053TV-7071ATV-7071B | LV-2419LV-2403LV-2406LV-2419TV-2457LV-2474PV-2481LV-3161ALV-3161BPV-3166LV-3192FV-5041TV-5064LV-6051FV-6086FV-6082LV-6082FV-7091FV-6059-1LV-0511USV-2041PV-3194TV-7255 | HV-3011 | FV-5383 | FV-2233 1FV-6081 | HV-2031 | USV-2038FV-2040 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUS 316 STL | SUS316 | SUS 316 SS | SUS316/HCR+SS | SUS 410 HT | SUS 321 STL | SUS 321 (HCR)SS | A351 CF8MENP + STL | A351 CF8MENP | A351CF8MPS | SUS440CHT | SUS 316HCR + SS | 316 (L) ST ST Stelite | ER410NiMo | Inc. |
| PV-1006USV-2094FV-2233-1LV-2403PV-2406LV-2441LV-2474PV-2481HV-3011PV-3166LV-3192FV-5041PV-5091APV-5207AFV-6082LV-6082FV-7091FV-6059-1LV-0511LV-7251 | LV-2419FV-2531-1FV-5020FV-5107PV-5091BPV-5109PV-5207BHV-5338FV-5383HV-0511PV-3194 | LV-3161ALV-3161 B | PV-1011 | PV-1045PV-2015PV-2073FV-2072FV-2091HV-2097FV-2079FV-2233-2LV-2372FV-2417FV-2531-2FV-2536AFV-2536BFV-3041FV-3171FV-3169PV-5069FV-5093FV-5161FV-5203FV-5239FV-5321FV-5336FV-5337FV-5367FV-5407AFV-6031FV-6070PV-7004PV-7034FV-5301PV-7056PV-7101FV-2150LV-6021ALV-6021BLV-2016HV-2371FV-7141FV-6059-2 | USV-2038USV-2041 | FV-2040HV-2031 | FV-2061 | PV-3042 | TV-2457TV-5064PV-6025LV-6051PV-7028PV-2363TV-2220TV-5277 | PV-2608FV-5441LV-5070 | FV-6081FV-6086 | PV-7002APV-7002BPV-7002CPV-7025APV-7025BPV-7031APV-7031BPV-7031CPV-7031DPV-7051APV-7051B | TV-7002TV-7003TV-7004TV-7026TV-7027TV-7025ATV-7025BTV-7032TV-7034TV-7052TV-7053TV-7071ATV-7071B | PV-2361 |

**JIS-ASME Standard Correspondence List**

|  |  |  |
| --- | --- | --- |
| Stainless steel (Casting) | Stainless steel |  |
| JIS | ASTM | JIS | AISI | Main Ingredient |
| SCS13A | CF8 | SUS304 | 304 | Cr18％-Ni8％ |
| SCS14A | CF8M | SUS316 | 316 | Cr18％-Ni12％-Mo2％ |
| SCS16A | CF3M | SUS316L | 316L | Cr18％-Ni12％-Mo2％-C0.03％(equal to below) |
| SCS10 |  | SUS319J4L |  | Cr25％-Ni6％-Mo3％-C0.03％(equal to below) |

|  |  |  |
| --- | --- | --- |
| Casting | Forging |  |
| Hastelloy C (equivalent to Hastelloy C276) | ASTM B564 N10276 | Cr15.5％-Ni57％-Mo16％ |
| Hastelloy B | ASTM B564 N10665 | Cr0.02-Ni62％-Mo28％ |
| Hastelloy C22 | ASTM B574 N06022 | Cr20.5％-Ni57％-Mo14.2％ |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SUS 316 | SUS321 | Inc. | SUS 630 PH | ANSI 431 |
| PV-1006PV-1011PV-1045PV-2015PV-2073FV-2072FV-2091USV-2094HV-2097FV-2079FV-2233-1FV-2233-2LV-2372FV-2417LV-2403LV-2419PV-2406LV-2441LV-2474PV-2481FV-2531-1FV-2531-2FV-2536APV-2536BPV-2608HV-3011FV-3041LV-3161ALV-3161BPV-3166FV-3171FV-3169LV-3192FV-5020FV-5041PV-5069FV-5093FV-5107FV-5161PV-5091APV-5091BPV-5109FV-5203PV-5207APV-5207BFV-5239FV-5441FV-5321FV-5336FV-5337HV-5338FV-5367FV-5383FV-5407AFV-6031FV-6070FV-6081FV-6086FV-6082LV-6082 | USV-2038FV-2040 | FV-2061PV-3042PV-6025 | TV-5064TV-2457LV-6051 |  |