|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tag | Stus | Bus | Cod | Type | Characteristic | Rating | Connection | Trim Form | Bonnet | Body | Plug | Seat Ring | Guide | Stem | Packing | Gasket | Rated  CV |
| PV-1006 | FLC | FF | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A216WCB | SUS  316  STL | SUS  316  STL | SCS  14A  HCR | SUS  316 | TFE  FIBER | T/#  1806  GR | 616 |
| PV-1011 | FC | FF | 510  D | Globe | Linear | 600 | RF | MULTI-STEP PLUG, BLANCE TYPE  MSCGV | STD | A216WCB | SUS 316/HCR+SS | SUS 316 /SS | SUS 316 | SUS 316 | TFE  FIBER | T/#  1806  GR | 18.82 |
| PV-1045 | FC | H. T | 550G | Globe | Linear | 600 | RF | Balnced  Multi  Hole  Cage | FIN  EXT. | A216WCB | SUS  410  HT | SUS  410  HT | SUS  410  HT | SUS  316 | GRAF  OIL | T/#  1806G | 196.1 |
| PV-2015 | FC | FF | 501G | Globe | Linear | 600 | RF | Balnced  CGV | FIN  EXT. | A216  WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | GRAF  OIL | T/#  1806G | 117 |
| USV-2038 | FC | 24V  DC | 501G |  | Linear | 600 | RF | Balnced | FIN  EXT. | A351CF8C | SUS  321  /STL | SUS321/STL | SUS  321/HCR | SUS321 | GRAFOIL | T/#  1808G | 215 |
| FV-2040 | FO | H. T | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | FIN  EXT. | A351  CF8C | SUS  321  SS | SUS  321  SS | SUS  321  HCR | SUS  321 | GRAF  OIL | T/#  1808G | 16 |
| PV-2073 | FC | FF | 550G | Globe | Linear | 600 | RF | Balnced  MULTI HOLE CAGE | FIN  EXT. | A216-WCB | SUS 410 /HT | SUS 410 /HT | SUS 410 /HT | SUS  316 | GRAF  OIL | T/#  1806G | 387 |
| FV-2072 | FO | H. T | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | FIN  EXT. | A216  WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | GRAF  OIL | T/#  1806G | 209 |
| FV-2091 | FC | FF | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | FIN  EXT. | A216  WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | GRAF  OIL | 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 | SUS  316  HCR | Inc. | GRAF  OIL | ------ | 4648.2 |
| USV-2094 | FO | 24V  DC | 501T | Globe | EQ% | 600 | RF | Unbalnc  SS | FIN  EXT | A105 | SUS  316  /STL | SUS316/STL | SUS  440C/HT | SUS316 | GRAFOIL | T/#1890-S | 13 |
| HV-2097 | FC | FF | 510D | Globe | Linear | 600 | RF | Balnced  MULTI STAGE CAGE  OVER | FIN  EXT. | A216WCB | SUS  410  HT | SUS  410  HT | 410 SS /HT | SUS 316 | GRAF  OIL | T/#  1806G | 7 |
| FV-2079 | FO | H. T | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A105 | SUS  410  /HT | SUS  410  /HT | SCS  24/  PH | SUS  316 | GRAF  OIL | T/#1806G | 7.4 |
| FV-2233 1 | FC | FF | 501T | Globe | Linear | 900 | RTJ | Unbalnc  SS | STD | SUSF 304L | SUS 316/ STL | SUS 316/ STL | SUS 316  PS | SUS 316 | TFE  FIBER | T/#  1808G | 7.2 |
| FV-2233 2 | FC | FF | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A105 | SUS  410  /HT | SUS  410  /HT | SCS  24  /PH | SUS 316 | TFE  FIBER | T/#  1806G | 9.64 |
| LV-2372 | FLC | H. T | 501G | Globe | EQ% | 1500 | RTJ | Balnced  CGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS 24 /PH | SUS 316 | TFE  FIBER | T/# 1806G | 48.8 |
| FV-2417 | FLC | H. T | 501G | Globe | EQ% | 1500 | RTJ | Balnced  CGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS  24  /PH | SUS 316 | TFE  FIBER | T/#  1806G | 209 |
| LV-2403 | FC | FF | 501G | Globe | Linear | 900 | RTJ | Balnced  CGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | GRAF  OIL | T/# 1806G | 29 |
| LV-2419 | FC | FF | 501G | Globe | Linear | 600 | RF | Balnced  CGV | STD | A351  CF8 | SUS 316 | SUS 316 | SCS  14A  HCR | SUS 316 | GRAF  OIL | T/#  1806G | 103.8 |
| PV-2406 | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced  CGV | STD | A351  CF8 | SUS 316  STL | SUS 316  STL | SCS  14A  HCR | SUS 316 | GRAF  OIL | T/#  1806G | 913 |
| LV-2441 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | Balnced  CGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | GRAF  OIL | T/#  1806G | 108 |
| TV-2457 | FC | FF | 710E | Butterfly | Approximate EQ% | 300 | Wafer | Ecentric  HPBV | STD | A351  CF8 | A351  CF8M  PS | SUS 316  PS  HG Type | SUS 316  Hcr | SUS 630  PH | GRAF  OIL | ------- | 3008 |
| LV-2474 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | Balnced  CGV | STD | A351CF8 | SUS 316 /STL | SUS 316 /STL | SUS 316 /HCR | SUS 316 | TFE  FIBER | T/#  1806G | 25.4 |
| PV-2481 | FC |  | 501G | Globe | Linear | 300 | RF | Balnced | STD | A351  CF8 | SUS 316  STL | SUS 316  STL | SCS  14A  HCR | SUS 316 | TFE  FIBER | T/#  1806G | 1050 |
| FV-2531 1 | FC | FF | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A216-WCB | SUS 316 | SUS 316  STL | SUS  440C  HT | SUS 316 | TFE  FIBER | T/#  1890S | 110 |
| FV-2531 2 | FC | FF | 501G | Globe | EQ% | 300 | RF | Balnced | STD | A216-WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 650 |
| FV-2536A | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced  CGV | STD | A216-WCB | SUS 410 /HT | SUS 410 /HT | SCS  24  /PH | SUS  316 | TFE  FIBER | T/#  1806G | 820 |
| PV-2536B | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced | STD | A216-WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 1050 |
| PV-2608 | FC | FF | 501T | Globe | Linear | 900 | RTJ | Unbalnc  SS | STD | A105 | SUS 440C/HT | SUS 440C/HT | SUS 440C/HT | SUS 316 | TFE  FIBER | T/#  1806G | 3.46 |
| HV-3011 | FC | FF | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A351  CF3 | SUS 316  STL | SUS 316  STL | SUS 316  PS | SUS 316 | TFE  FIBER | 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. | GRAF  OIL | ------ | 4406 |
| FV-3041 | FLC | H. T | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A216WCB | SUS 410 /HT | SUS 410 /HT | SCS  24  /PH | SUS 316 | TFE  FIBER | T/#  1806G | 9.7 |
| LV-3161A | FC | H. T | 510D | Globe | Linear | 900 | RTJ | Balnced  OVER PLUG FLOW  MSCGV | 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 | Balnced  OVER PLUG FLOW  MSCGV | 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 | Balnced  CGV | 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 | Balnced  CGV | 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 | Balnced  MULTI STEP PLUG  MSCGV | 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 | Balnced  CGV | 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 | Unbalnc  SS | STD | A105 | SUS  316 | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 9.55 |
| FV-5041 | FC | FF | 501G | Globe | EQ% | 150 | RF | Balnced | STD | A351CF8 | SUS  316  STL | SUS  316  STL | SCS  14A  HCR | SUS  316 | TFE  FIBER | T/#  1806G | 320 |
| TV-5064 | FC | FF | 710E | Butterfly | Approximate EQ% | 300 | Wafer | Ecentric  HPBV | STD | A351CF8 | A351CF8M  PS | SUS  316  PS  HG TyPE | SUS  316  HCR | SUS  630  PH | GRAF  OIL | --- | 3952 |
| PV-5069 | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced  CGV | FIN  EXTN. | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | GRAF  OIL | T/#  1806G | 408 |
| FV-5093 | FC | H. T | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 148 |
| FV-5107 | FC | FF | 501T | Globe | EQ% | 300 | RF | Unbalnc  SS |  | A105 | SUS  316 | SUS  316  /STL | SUS  440C/HT | SUS  316 | TFE FIBER | T/#  1890-S | 1.17 |
| FV-5161 | FC | FF | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 327 |
| PV-5091A | FC | H. T | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A216WCB | SUS  316  STL | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 8 |
| PV-5091B | FC | H. T | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A216WCB | SUS  316 | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 66 |
| PV-5109 | FC | FF | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A216WCB | SUS  316 | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 121 |
| FV-5203 | FC | H. T | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 320 |
| PV-5207A | FO | H. T | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A105 | SUS  316  STL | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 4 |
| PV-5207B | FC | H. T | 501T | Globe | EQ% | 300 | RF | Unbalnc  SS | STD | A216  WCB | SUS  316 | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 38 |
| FV-5239 | FC | FF | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 155 |
| FV-5441 | FC | FF | 501T | Globe | EQ% | 300 | RF | Unbalnc  SS | STD | A105 | SUS  440C  HT | SUS  440C  HT | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 3.53 |
| FV-5321 | FC | H. T | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 492 |
| FV-5336 | FC | FF | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 48 |
| FV-5337 | FC | FF | 501G | Globe | EQ% | 300 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 162 |
| HV-5338 | FC | FF | 501T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A105 | SUS  316 | SUS  316  STL | SUS  440C  HT | SUS  316 | TFE  FIBER | T/#  1890S | 15 |
| FV-5367 | FC | FF | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 13.8 |
| FV-5383 | FC | FF | 501T | Globe | EQ% | 150 | RF | Unbalnc  SS | STD | SUS  F304 | SUS  316 | SUS  316 | SUS  316  PS | SUS  316 | TFE  FIBER | T/#  1890-316 | 8.3 |
| FV-5407A | FC | FF | 510D | Globe | Linear | 600 | RF | BLANC TYPE OVER PLUG FLOW  MSCGV | STD | A105 | SUS  410/  HT | SUS  410/  HT | 410 SS/  HT | SUS316 | TFE FIBER | T/#  1806G | 1.43 |
| FV-6031 | FC | FF | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 29 |
| PV-6025 | FC | H. T | 720C | Butterfly | Approximate EQ% | 600 | RF | Ecentric  HPBV | STD | A216-WCB | A351CF8M  /PS | SUS630/PH  HG Type | SUS  316/Hcr | Inc. | GRAFOIL | --- | 3272 |
| FV-6070 | FC | H. T | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | FIN  EXTN. | A216WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | GRAF  OIL | T/#  1806G | 665.4 |
| FV-6059 1 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | Balnced  CGV | STD | A351CF8 | SUS  316/  STL | SUS  316/  STL | SUS  316/HCR | SUS316 | GRAFOIL | T/#  1806G | 40 |
| LV-6051 | FC | FF | 720C | Butterfly | Approximate EQ% | 900 | RTJ | Ecentric  HPBV | STD | A351CF8 | A351CF8M/PS | SUS316/PS | SUS  316/Hcr | SUS630/PH | GRAFOIL | ---- | 2117 |
| FV-6081 | FC | FF | 510D | Globe | Linear | 1500 | RTJ | UnblnceTYPE OVER PLUG FLOW  MSCGV | STD | SUSF304L | SUS  316  /HCR+SS | SUS316/SS | SUS  316 | SUS316 | TFE FIBER | T/#  1806G | 1.12 |
| FV-6086 | FC | FF | 510D | Globe | Linear | 900 | RTJ | Balnce  TYPE OVER PLUG FLOW  MSCGV | FIN  EXTN. | A351CF8 | SUS  316/  HCR+SS | SUS316/SS | SUS  316 | SUS316 | GRAFOIL | T/#  1806G | 14.5 |
| USV-6082 | FC |  | S1.2 | Butterfly |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FV-6082 | FC | FF | 501T | Globe | Linear | 150 | RF | Unbalnc  SS | STD | A351  CF8 | SUS  316  STL | SUS  316  STL | SUS  316  PS | SUS  316 | TFE  FIBER | T/#  1890-316 | 7.2 |
| LV-6082 | FC | FF | 501T | Globe | Linear | 150 | RF | Unbalnc  SS | STD | A351  CF8 | SUS  316  STL | SUS  316  STL | SUS  316  PS | SUS  316 | TFE  FIBER | T/#1890-316 | 27 |
| PV-7002A | FLO | FF |  | Globe | Linear | 1500 |  | Multi Flow  Over  Balnced | Normalising | A217  WC6 | 316  STST  +  Stelit | 316  STST  +  Stelit | 420  ST.ST | AG  38 | GRAFOIL | 316  ST.ST  Graphit | 46.6  23.3 |
| PV-7002B | FLO | FF |  | Globe | Linear | 1500 |  | Multi Flow  Over  Balnced | Normalising | A217  WC6 | 316  STST  +  Stelit | 316  STST  +  Stelit | 420  ST.ST | AG  38 | GRAFOIL | 316  ST.ST  Graphit | 467  407 |
| PV-7002C | FLO | FF |  | Globe | Linear | 1500 |  | Multi Flow  Over  Balnced | Normalising | A217  WC6 | 316  STST  +  Stelit | 316  STST  +  Stelit | 420  ST.ST | AG  38 | GRAFOIL | 316  ST.ST  Graphit | 467  407 |
| PV-7004 | FC | FF | 510  D | Globe | Linear | 600 | RF | Balnced  over plug flow  MSCGV | FIN  EXTN. | A216WCB | SUS  410/  HT | SUS410/HT | 410  SS/  HT | SUS316 | GRAFOIL | T/#  1806G | 930 |
| TV-7002 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 0.39 |
| TV-7003 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 3.96 |
| TV-7004 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410  NiMo |  |  |  | Graphit |  | 3.96 |
| PV-7025A | FLO | FF |  | Globe | Linear | 1500 |  | Multi Flow  Over  Balnced | Normalising | A217  WC6 | 316  STST  +  Stelit | 316  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316  ST.ST  Graphit | 134  116 |
| PV-7025B | FLO | FF |  | Globe | Linear | 1500 |  | Multi Flow  Over  Balnced | Normalising | A217  WC6 | 316  STST  +  Stelit | 316  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316  ST.ST  Graphit | 134  116 |
| TV-7026 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 0.51 |
| TV-7027 | FLO | FF |  | Gate |  | 1500 | RJ |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 0.51 |
| PV-7028 | FC | FF | 720C | Butterfly | Approximate EQ% | 600 | RF | Ecentric  HPBV | STD | A217WC6 | A351  CF8M/PS | SUS316/PS HG | SUS  316  /Hcr | Inc. | GRAFOIL | --- | 2702 |
| TV-7025A | FC | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 7.8 |
| TV-7025B | FC | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 7.8 |
| PV-7031A | FLO | FF |  | Globe | Linear | 600 | RF | Multi Flow  Over  Balnced | Normalising | A216WCB | 316L  STST  +  Stelit | 316L  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316L  ST.ST  Graphit | 829  619 |
| PV-7031B | FLO | FF |  | Globe | Linear | 600 | RF | Multi Flow  Over  Balnced | Normalising | A216WCB | 316L  STST  +  Stelit | 316L  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316L  ST.ST  Graphit | 829  619 |
| PV-7031C | FLO | FF |  | Globe | Linear | 600 | RF | Multi Flow  Over  Balnced | STD | A216WCB | 316L  STST  +  Stelit | 316L  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316L  ST.ST  Graphit | 111  63 |
| PV-7031D | FLO | FF |  | Globe | Linear | 600 | RF | Multi Flow  Over  Balnced | STD | A216WCB | 316L  STST  +  Stelit | 316L  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316L  ST.ST  Graphit | 111  63 |
| TV-7032 | FLO | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 6.6 |
| TV-7033 | FLO | FF |  | Gate |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 6.6 |
| PV-7051A |  |  |  | Globe | Linear | 600 | RF | Cascade  Under  Balnced | Normalising | A216WCB | 316L  STST  +  Stelit | 316L  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316L  ST.ST  Graphit | 238  182 |
| PV-7051B |  |  |  | Globe | Linear | 600 | RF | Cascade  Under  Balnced | Normalising | A216WCB | 316L  STST  +  Stelit | 316L  STST  +  Stelit | 420  ST.ST | A636 | GRAFOIL | 316L  ST.ST  Graphit | 238  182 |
| TV-7052 |  |  |  |  |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 2.6 |
| TV-7053 |  |  |  |  |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 2.6 |
| PV-7034 | FC | FF | 510  D | Globe | Linear | 600 | RF | Balnced  over plug flow  MSCGV | FIN  EXTN. | A216WCB | SUS  410/  HT | SUS410/HT | 410  SS/  HT | SUS316 | GRAFOIL | T/#  1806G | 703 |
| TV-7071A | FC | FF |  | Angle |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 0.6 |
| TV-7071B | FC | FF |  | Angle |  | 600 | RF |  |  | A182 F11 | ER 410  NiMo |  |  | AISI  431 | Graphit |  | 0.6 |
| FV-5301 | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced  CGV | STD | A217  WC9 | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  316 | TFE  FIBER | T/#  1806G | 320 |
| FV-7091 | FLC | FF | 501G | Globe | EQ% | 150 | RF | Balnced  CGV | STD | A351  CF8 | SUS  316  STL | SUS  316  STL | SCS  14A  HCR | SUS  316 | TFE  FIBER | T/#  1806G | 114.5 |
| PV-7056 | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced  CGV | FIN  EXTN. | A216  WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  630  PH | GRAF  OIL | T/#  1806G | 2587 |
| PV-7101 | FC | FF | 501G | Globe | Linear | 300 | RF | Balnced  CGV | FIN  EXTN. | A216  WCB | SUS  410  HT | SUS  410  HT | SCS  24  PH | SUS  630  PH | GRAF  OIL | T/#  1806G | 2774 |
| FV-2150 | FC | H. T | 501G | Globe | EQ% | 600 | RF | Balnced  CGV | STD | A216  WCB | SUS  410  /HT | SUS  410  /HT | SCS  24  /PH | SUS  316 | GRAF  OIL | T/#  1806G | 19.6 |
| HV-2031 | FC | FF | 550G | Globe | Linear | 600 | RF | Balnced  Multi  Hole  Cage  Over | FIN  EXTN. | SUSF 321 | SUS  321  HCR +SS | SUS  321  SS | SUS  321  HCR | SUS  321 | GRAF  OIL | T/#  1808G | 6 |
| LV-6021A | FC | FF | 501G | Globe | EQ% | 600 | RF | Balnced  CGV5070 | FIN  EXTN. | A216  WCB | SUS  410  /HT | SUS  410  /HT | SCS  24  /PH | SUS  316 | GRAF  OIL | T/#  1806G | 334 |
| LV-6021B | FC | FF | 550G | Globe | EQ% | 600 | RF | Balnced  MHCGV | FIN  EXTN. | A216WCB | SUS  410/  HT | SUS  410/  HT | SUS  410/  HT | SUS  316 | GRAFOIL | T/#  1806G | 156 |
| LV-5070 | FC | FF | 501T | Globe | EQ% | 300 | RF | Unbalnc  SS | STD | A217  WC9 | SUS  440C  /HT | SUS  440C  /HT | SUS  440C  /HT | SUS  316 | TFE  FIBER | T/#  1890S | 23.65 |
| PV-2361 | FLC | FF | 510D | Globe | Linear | 1500 | RTJ | Balnced  MULTI STEP PLUG  MSCGV | FIN  EXTN. | A217WC6 | Inc. | Inc. | Inc. | SUS  316 | GRAF  OIL | T/#  1806G | 114 |
| PV-2363 | FLO | H. T | 720C | Butterfly | Approximate EQ% | 1500 | RTJ | Ecentric  HPBV | STD | A217WC6 | A351CF8M/PS | SUS 316 /PS HG | SUS 316 /Hcr | Inc. | GRAF  OIL | ------ | 4414 |
| LV-2016 | FC | H. T | 510D | Globe | Linear | 600 | RF | Balnced  over plug flow  MSCGV | FIN  EXTN. | A217WC9 | SUS  410/  HT | SUS410/HT | 410  SS/HT | SUS316 | GRAFOIL | T/#  1806G | 4.78 |
| HV-2371 | FC | FF | 510D | Globe | Linear | 900 | RTJ | Balnced  over plug flow  MSCGV | FIN  EXTN. | A217WC9 | SUS  410/  HT | SUS410/HT | 410  SS/  HT | SUS316 | GRAFOIL | T/#  1806G | 14 |
| FV-7141 | FC | FF | 510D | Globe | Linear | 1500 | RTJ | Balnced  over plug flow  MSCGV | STD | A216  WCB | SUS  410/  HT | SUS  410/  HT | 410  SS/  HT | SUS316 | TFE FIBER | T/#  1806G | 39.6 |
| TV-2220 | FLO | FF | 720  C | Butterfly | Approximate EQ% | 600 | RF | Ecentric  HPBV | STD | A216WCB | A351CF8M/PS | SUS630/PH | SUS  316 /Hcr | SUS630/PH | TFE FIBER | ------ | 501 |
| FV-6059 2 | FC | FF | 501G | Globe | Linear | 600 | RF | Balnced | STD | A216WCB | SUS  410  /HT | SUS410/HT | SCS  24  /PH | SUS316 | TFE FIBER | T/#  1806G | 17.5 |
| FV-6059 1 | FC | FF | 501G | Globe | EQ% | 900 | RTJ | Balnced  CGV | STD | A351CF8 | SUS  316/  STL | SUS316/STL | SUS  316/HCR | SUS316 | GRAFOIL | T/#  1806G | 40 |
| HV-0511 | FC | FF | 501  T | Globe | EQ% | 150 | RF | Unbalnc  SS | STD | A216WCB | SUS  316 | SUS316/STL | SUS  440C/HT | SUS316 | TFE FIBER | T/#  1890-S | 87.7 |
| LV-0511 | FC | FF | 501  G | Butterfly | Linear | 300 | RF | Unbalnc  HPBV | STD | A351CF8 | SUS  316  /STL | SUS316/STL | SUS  316/HCR | SUS316 | TFE FIBER | T/#  1806GR | 142 |
| USV-2041 | FC | 24VDC | 501G | Globe | Linear | 600 | RF | Balnced  CGV | FIN  EXTN. | A351CF8C | SUS  321  /STL | SUS321/STL | SUS  321/HCR | SUS321 | GRAFOIL | T/#  1808G | 70 |
| LV-7251 | FC | FF | 501  T | Globe | Linear | 300 | RF | Unbalnc  SS | STD | A217WC9 | SUS  316  /STL | SUS316/STL | SUS  440C/HT | SUS316 | TFE FIBER | T/#  1890-S | 7.4 |
| PV-3194 | FC | FF | 501  G | Globe | EQ% | 150 | RF | Balnced  CGV | STD | A351CF8 | SUS 316 | SUS 316 | SCS 14A  HCR | SUS 316 | TFE  FIBER | T/#  1806G | 167 |
| TV-5277 | FC | FF | 710  E | Butterfly | Approximate  EQ% | 300 | Wafer | Ecentric  HPBV | STD | A351CF8 | A351CF8M  PS | SUS 316  PS  HG TYPE | SUS 316  HCR | SUS  630  PH | GRAF  OIL |  | 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 |
| Handwheel  Disk with integral seat  Rings fitted to body or disk for sealing, seating, or rataining purposes |
| Carbon steel | 1501.151  1503.221  1504.161 |
|  | 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

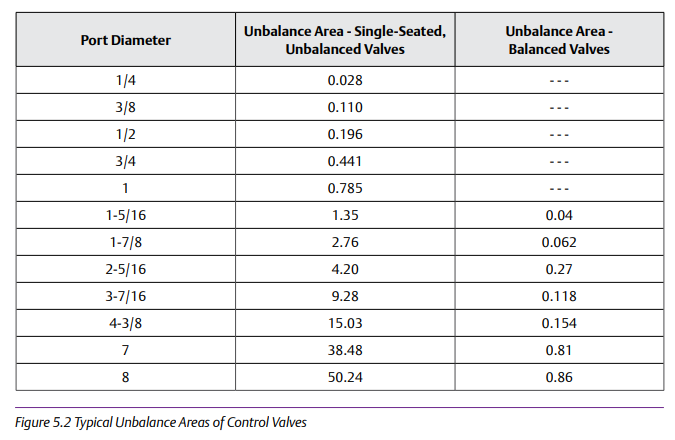
single seated valves, a change in flow direction through the valve may, however already be sufficient. Where hardened trim materials and/or a

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.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A216 WCB | A217 WC6 | A217 WC9 | A105 | A182 F11 | A351 CF8 | A351 CF3 | SUS F304 | SUS F304L | SUS  F321 | A351 CF8C |
| PV-1006 PV-1011  PV-1045  PV-2015  PV-2073  FV-2072  FV-2091  FV-2061  HV-2097  LV-2372  FV-2417  PV-2531-1  PV-2531-2  FV-2536A  PV-2536B  PV-3042  FV-3041  FV-3169  FV-3171  PV-5069  FV-5093  FV-5161  PV-5091A  PV-5091B  PV-5109  FV-5203  PV-5207B  FV-5239  FV-5321  Fv-5336  FV-5337  FV-5367  FV-6031  PV-6025  FV-6070  PV-7031A  PV-7031B  PV-7031C  PV-7031D  PV-7051A  PV-7051B  PV-7034  PV-7056  PV-7101  FV-2150  LV-6021A  LV-6021B  FV-7141  TV-2220  FV-6059-2  HV-0511 | PV-7002A  PV-7002B  PV-7002C  PV-7025A  PV-7025B  PV-7028  LV-5070  PV-2361  PV-2363 | FV-5301  FV-5070  LV-2016  HV-2371  LV-7251 | USV-2094  FV-2079  FV-2233 2  PV-2608  FV-5020  FV-5107  PV-5207A  FV-5441  FV-5338  FV-5407 | TV-7002  TV-7003  TV-7004  TV-7026  TV-7027  TV-7025A  TV-7025B  TV-7032  TV-7033  TV-7052  TV-7053  TV-7071A  TV-7071B | LV-2419  LV-2403  LV-2406  LV-2419  TV-2457  LV-2474  PV-2481  LV-3161A  LV-3161B  PV-3166  LV-3192  FV-5041  TV-5064  LV-6051  FV-6086  FV-6082  LV-6082  FV-7091  FV-6059-1  LV-0511  USV-2041  PV-3194  TV-7255 | HV-3011 | FV-5383 | FV-2233 1  FV-6081 | HV-2031 | USV-2038  FV-2040 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SUS 316 STL | SUS316 | SUS 316 SS | SUS316/HCR  +SS | SUS 410 HT | SUS 321 STL | SUS 321 (HCR)SS | A351 CF8M  ENP + STL | A351 CF8M  ENP | A351CF8M  PS | SUS440C  HT | SUS 316  HCR + SS | 316 (L) ST ST Stelite | ER410NiMo | Inc. |
| PV-1006  USV-2094  FV-2233-1  LV-2403  PV-2406  LV-2441  LV-2474  PV-2481  HV-3011  PV-3166  LV-3192  FV-5041  PV-5091A  PV-5207A  FV-6082  LV-6082  FV-7091  FV-6059-1  LV-0511  LV-7251 | LV-2419  FV-2531-1  FV-5020  FV-5107  PV-5091B  PV-5109  PV-5207B  HV-5338  FV-5383  HV-0511  PV-3194 | LV-3161A  LV-3161 B | PV-1011 | PV-1045  PV-2015  PV-2073  FV-2072  FV-2091  HV-2097  FV-2079  FV-2233-2  LV-2372  FV-2417  FV-2531-2  FV-2536A  FV-2536B  FV-3041  FV-3171  FV-3169  PV-5069  FV-5093  FV-5161  FV-5203  FV-5239  FV-5321  FV-5336  FV-5337  FV-5367  FV-5407A  FV-6031  FV-6070  PV-7004  PV-7034  FV-5301  PV-7056  PV-7101  FV-2150  LV-6021A  LV-6021B  LV-2016  HV-2371  FV-7141  FV-6059-2 | USV-2038  USV-2041 | FV-2040  HV-2031 | FV-2061 | PV-3042 | TV-2457  TV-5064  PV-6025  LV-6051  PV-7028  PV-2363  TV-2220  TV-5277 | PV-2608  FV-5441  LV-5070 | FV-6081  FV-6086 | PV-7002A  PV-7002B  PV-7002C  PV-7025A  PV-7025B  PV-7031A  PV-7031B  PV-7031C  PV-7031D  PV-7051A  PV-7051B | TV-7002  TV-7003  TV-7004  TV-7026  TV-7027  TV-7025A  TV-7025B  TV-7032  TV-7034  TV-7052  TV-7053  TV-7071A  TV-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％ |

STEM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SUS 316 | SUS321 | Inc. | SUS 630 PH | A638 Gr 660 | AISI 431 |
| PV-1006  PV-1011  PV-1045  PV-2015  PV-2073  FV-2072  FV-2091  USV-2094  HV-2097  FV-2079  FV-2233-1  FV-2233-2  LV-2372  FV-2417  LV-2403  LV-2419  PV-2406  LV-2441  LV-2474  PV-2481  FV-2531-1  FV-2531-2  FV-2536A  PV-2536B  PV-2608  HV-3011  FV-3041  LV-3161A  LV-3161B  PV-3166  FV-3171  FV-3169  LV-3192  FV-5020  FV-5041  PV-5069  FV-5093  FV-5107  FV-5161  PV-5091A  PV-5091B  PV-5109  FV-5203  PV-5207A  PV-5207B  FV-5239  FV-5441  FV-5321  FV-5336  FV-5337  HV-5338  FV-5367  FV-5383  FV-5407A  FV-6031  FV-6070  FV-6081  FV-6086  FV-6082  LV-6082  PV-7004  PV-7034  FV-5301  FV-7091  FV-2150  LV-6021A  LV-6021B  LV-5070  PV-2361  LV-2016  HV-2371  FV-7141  FV-6059-1  FV-6059-2  HV-0511  LV-0511  LV-7251  PV-3194 | USV-2038  FV-2040  HV-2031  USV-2041 | FV-2061  PV-3042  PV-6025  PV-7028  PV-2363 | TV-5064  TV-2457  LV-6051  PV-7056  PV-7101  TV-2220  TV-5277 | PV-7002A  PV-7002B  PV-7002C  PV-7025A  PV-7025B  PV-7031A  PV-7031B  PV-7031C  PV-7031D  PV-7051A  PV-7051B | TV-7002  TV-7003  TV-7004  TV-7026  TV-7027  TV-7025A  TV-7025B  TV-7032  TV-7033  TV-7052  TV-7053  TV-7071A  TV-7071B |

PACKING

|  |  |  |  |
| --- | --- | --- | --- |
| TFE FIBER | GRAFOIL | GRAPHITE |  |
| PV-1006  PV-1011  FV-2233-1  FV-2233-2  LV-2372  FV-2417  LV-2474  PV-2481  FV-2531-1  FV-2531-2  FV-2536A  PV-2536B  PV-2608  HV-3011  FV-3041  LV-3161A  LV-3161B  PV-3166  FV-3171  FV-3169  LV-3192  FV-5020  FV-5041  FV-5093  FV-5107  FV-5161  FV-5091A  FV-5091B  PV-5109  FV-5203  PV-5207A  PV-5207B  FV-5239  FV-5441  FV-5321  FV-5336  FV-5337  HV-5338  FV-5367  FV-5383  FV-5407A  FV-6031  FV-6081  FV-6082  LV-6082  FV-5301  FV-7091  LV-5070  FV-7141  TV-2220  FV-6059-2  HV-0511  LV-0511  LV-7251  PV-3194 | PV-1045  PV-2015  USV-2038  FV-2040  PV-2073  FV-2072  FV-2091  FV-2061  USV-2094  HV-2097  FV-2079  LV-2403  LV-2419  PV-2406  LV-2441  TV-2457  PV-3042  TV-5064  PV-5069  PV-6025  FV-6070  LV-6051  FV-6086  PV-7002A  PV-7002B  PV-7002C  PV-7004  PV-7025A  PV-7025B  PV-7028  PV-7031A  PV-7031B  PV-7031C  PV-7031D  PV-7051A  PV-7051B  PV-7034  PV-7056  PV-7101  FV-2150  HV-2031  LV-6021A  LV-6021B  PV-2361  PV-2363  LV-2016  HV-2371  FV-6059-1  USV-2041  TV-5277 | TV-7002  TV-7003  TV-7004  TV-7026  TV-7027  TV-7025A  TV-7025B  TV-7032  TV-7033  TV-7052  TV-7053  TV-7071A  TV-7071B |  |

TYPE

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| 501G | 510D | 550G | 501T | 710E | 730E | 720C |
| PV-1006 (2bar)  PV-2015 (0.5bar)  USV-2038  FV-2040 (7bar)  FV-2072 (2bar)  FV-2091 (1bar)  FV-2079 (9bar)  FV-2233-2 (3bar)  LV-2372 (5bar)  FV-2417 (5bar)  LV-2403 (1bar)  LV-2419 (0.1bar)  PV-2406 (24bar)  LV-2441 (1bar)  LV-2474 (9.8bar)  PV-2481 (22.5bar)  FV-2531-2 (2bar)  FV-2536A (1.6bar)  PV-2536B (2bar)  FV-3041  PV-3166  FV-3171  LV-3192  FV-5041 (1bar)  PV-5069 (4.6bar)  FV-5093 (1bar)  FV-5161 (1bar)  FV-5203 (1.5bar)  FV-5239 (1bar)  FV-5321 (1bar)  FV-5336 (5.3bar)  FV-5337 (1bar)  FV-5367 (6bar)  FV-6031 (6bar)  FV-6070 (3.5bar)  FV-5301 (4bar)  FV-7091 (5bar)  PV-7056 (4bar)  PV-7101 (2bar)  FV-2150 (1bar)  LV-6021A (1bar)  FV-6059-1  FV-6059-2  LV-0511  USV-2041  PV-3194 (0.5bar) | PV-1011 (46bar)  HV-2097 (37bar)  LV-3161A  LV-3161B  FV-3169  FV-5407A  FV-6081  FV-6086  PV-7004  PV-7034  PV-2361 (80bar)  LV-2016  HV-2371  FV-7141 | PV-1045 (46bar)  PV-2073 (41bar)  HV-2031 (23bar)  LV-6021B | USV-2094  FV-2233-1 (5bar)  FV-2531-1 (2bar)  PV-2608 (26bar)  HV-3011 (22.5bar)  FV-5020 (1bar)  FV-5107 (1.3bar)  PV-5091A (8bar)  PV-5091B (0.2bar)  PV-5109 (0.2bar)  PV-5207A (8bar)  PV-5207B (0.35)  FV-5441 (0.9)  HV-5338 (1.1bar)  FV-5383 (1bar)  FV-6082 (1bar)  LV-6082 (4.2bar)  LV-5070 (3bar)  HV-0511  LV-7251 | TV-2457 (0.1 bar)  TV-5064 (0.1 bar)  TV-5277 (0.1 bar) | PV-3042  FV-2061 (0.4bar) | PV-6025  LV-6051  PV-7028  PV-2363 (0.3bar)  TV-2220 |