

|         | <b>ARGAL pumps</b>    | TMR - ZMR                  |  | Chemical Resistance List  |                  |               |               |                           | GFR-PP (WR) | CFF E-CTFE (GF - GX) | EPDM (E)  | FKM (V)       | int. structure (N - R - X) or mech. seals (SFI - TS5/6) (MSFA-MTSCD) |               |           |      |           |
|---------|-----------------------|----------------------------|--|---|------------------|---------------|---------------|---------------------------|-------------|----------------------|-----------|---------------|--|---------------|-----------|------|-----------|
| Ref. N. | Medium                | Synonymus                  |  | Formula   | Specific gravity | Melting point | Boiling point | Concentration             | Resistant   | Not Resistant        | Resistant | Not Resistant | Resistant  | Not Resistant | Resistant |      |           |
| 1       | acetaldehyde          | ethanale                   |  | CH <sub>3</sub> -COH  | 0,8              | 20,2          |               | 40%, aqueous solution     | 20          | 40                   | 20        | 80            | 80   |               | 40        | 80   | yes       |
| 2       | acetaldehyde          |                            |  |   |                  |               |               | technically pure          | (20)        | 40                   | 20        | 40            | 20   | 60            | (20)      | 40   | yes       |
| 3       | acetic acid           | ethanoic acid              |  | CH <sub>3</sub> .COOH   | 1,0              | 16,6          |               | 10%, aqueous              | 80          |                      | 100       |               | 40   | (60)          | (20)      | 40   | yes       |
| 4       | acetic acid           |                            |  |   |                  |               |               | 50%, aqueous              | 60          |                      | 100       |               | 20   |               | (20)      |      | yes       |
| 5       | acetic acid           |                            |  |   |                  |               |               | technically pure, glacial | 40          | 60                   | 100       |               | (20)   |               | -         | 20   | yes       |
| 6       | acetic acid anhydride |                            |  | (CH <sub>3</sub> CO) <sub>2</sub> O   | 1,1              |               |               | technically pure          | 20          | (40)                 | 20        |               | (20)   |               | -         | 20   | yes       |
| 7       | acetone               |                            |  | CH <sub>3</sub> .CO.CH <sub>3</sub>   | 0,79             | 56,2          |               | up to 10%, aqueous        | 60          |                      | 80        |               | 60   | (40)          | 60        |      | yes       |
| 8       | acetone               |                            |  |   |                  |               |               | technically pure          | 40          |                      | 80        | 100           | 60   |               | -         | 20   | yes       |
| 9       | acetyl chloride       |                            |  | CH <sub>3</sub> CO-Cl   | 1,11             | 51            |               | technically pure          | 40          |                      | 60        |               | -  | 20            | -         | 20   | yes       |
| 10      | acrylic nitrile       | vinyl cyanide              |  | CH <sub>2</sub> :CH-CN  | 0,81             | 77,3          |               | technically pure          | 20          | (40)                 | 20        |               | 40   | (60)          | (40)      | 60   | yes       |
| 11      | allyl alcohol         | propenol                   |  | CH <sub>2</sub> :CH-CH <sub>2</sub> OH  | 0,86             | 97,1          |               | technically pure          | 60          |                      | 80        |               | (60)   | 80            | (20)      | 40   | yes       |
| 12      | aluminium chloride    |                            |  | AlCl <sub>3</sub> .6H <sub>2</sub> O  | 1,05*            |               |               | 10%, aqueous              | 60          |                      | 120       |               | 60   |               | 100       |      | yes       |
| 13      | aluminium chloride    |                            |  |   | 1,58*            |               |               | saturated                 | 80          | (100)                | 120       |               | 100  |               | 100       |      | yes       |
| 14      | aluminium sulphate    |                            |  | Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> .18H <sub>2</sub> O                             | 1,7              | 86,5          |               | 10%, aqueous              | 100         |                      | 120       |               | 60   |               | 80        |      | yes       |
| 15      | aluminium sulphate    |                            |  |   |                  |               |               | cold saturated, aqueous   | 80          |                      | 120       |               | 60   |               | 80        |      | yes       |
| 16      | ammonium acetate      |                            |  | NH <sub>4</sub> C <sub>2</sub> H <sub>3</sub> O <sub>2</sub>                                    | 1,1              | 114           |               | all, aqueous              | 100         |                      | 60        |               | 60   | (80)          | 60        |      | yes       |
| 17      | ammonium bifluoride   |                            |  | NH4HF <sub>2</sub>  | 1,2              | 80            |               | 50%, aqueous              | -           | 20                   | 120       |               | 20   |               | 20        |      | see notes |
| 18      | ammonium carbonate    |                            |  | (NH <sub>4</sub> ) <sub>2</sub> CO <sub>3</sub> .H <sub>2</sub> O                               | 1,1              | 58            |               | 50%, aqueous              | 100         |                      | 120       |               | 80   |               | 80        |      | yes       |
| 19      | ammonium hydroxide    | ammonia water              |  | NH <sub>4</sub> OH  | 1,1              | 38            |               | cold saturated, aqueous   | 60          |                      | 120       |               | 80   | (100)         | -         | 20   | see notes |
| 20      | ammonium nitrate      |                            | beta   | NH <sub>4</sub> NO <sub>3</sub>   | 1,7              | 170           |               | aqueous, all/saturated    | 60          | (80)                 | 120       |               | 60   |               | 80        |      | yes       |
| 21      | ammonium phosphate    |                            |  | NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub>  | 1,8              | 110           |               | all, aqueous              | 100         |                      | 120       |               | 80   |               | 100       |      | yes       |
| 22      | ammonium sulphate     |                            |  | (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>   | 1,8              |               |               | aqueous, all/saturated    | 100         |                      | 120       |               | 80   |               | 100       |      | yes       |
| 23      | ammonium sulphide     |                            |  | (NH <sub>4</sub> ) <sub>2</sub> S   | 1,2              |               |               | 50%, aqueous              | 60          |                      | 120       |               | 60   |               | 20        | 60   | yes       |
| 24      | amyl acetate          |                            |  | CH <sub>3</sub> CO <sub>2</sub> -C <sub>3</sub> H <sub>11</sub>                                 | 0,88             |               |               | technically pure          | (40)        | 60                   | 40        | (80)          | (20)   | -             | 20        |      | yes       |
| 25      | amyl alcohol          |                            |  | CH <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> -CH <sub>2</sub> OH                             | 0,82             |               |               | technically pure          | 80          |                      | 120       |               | 60   |               | (20)      |      | yes       |
| 26      | amyl chloride         |                            |  | CH <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> -CH <sub>2</sub> Cl                             | 0,88             | 108,4         |               | technically pure          | -           | 20                   | 120       |               | -  | 20            | 20        |      | yes       |
| 27      | aniline               | aminobenzene               |  | C <sub>6</sub> H <sub>5</sub> -NH <sub>2</sub>  | 1,0              | -6,1          |               | technically pure          | (20)        |                      | 100       | (120)         | -  | 20            | (60)      |      | yes       |
| 28      | antimony trichloride  |                            |  | SbCl <sub>3</sub>   | 2,7*             | 73,4          |               | 90%, aqueous              | 60          |                      | 20        |               | 20   |               | 20        |      | see notes |
| 29      | aqua regia            | mixed acid (chloro-nitric) | 80:20  | HCl+HNO <sub>3</sub>  | 1,5              | 81            |               | usual comm.               | -           | 20                   | 100       |               | -  | 20            |           | (20) | yes       |
| 30      | arsenic acid          |                            | ortho  | H <sub>2</sub> AsO <sub>4</sub> -H <sub>2</sub> O   | 2*               | 35,5          |               | 80%, aqueous              | 80          |                      | 120       |               | 80   |               | 100       |      | yes       |
| 31      | barium hydroxide      |                            |  | Ba(OH) <sub>2</sub> .8H <sub>2</sub> O  | 2,2              | 77,9          |               | aqueous, saturated        | 40          |                      | 120       |               | 80   |               | 80        |      | see notes |
| 32      | barium nitrate        |                            |  | Ba(NO <sub>3</sub> ) <sub>2</sub>   | 3,2              |               |               | all, aqueous              | 80          |                      | 120       |               | 80   |               | 80        |      | yes       |
| 33      | benzaldehyde          |                            |  | C <sub>6</sub> H <sub>5</sub> :CH:O   | 1,0              |               |               | aqueous, saturated        | 20          |                      | 40        | (80)          | 60   |               | 60        |      | yes       |
| 34      | benzene               | benzol                     |  | C <sub>6</sub> H <sub>6</sub>   | 0,88             | 5,5           | 80,1          | technically pure          | (20)        | 40                   | 40        | (60)          | -  | 20            | 20        |      | yes       |
| 35      | benzyl alcohol        | phenyl carbinol            |  | C <sub>6</sub> H <sub>5</sub> -CH <sub>2</sub> OH   | 1,05             | -15,2         |               | technically pure          | 40          | (60)                 | 120       |               | -  | 20            | 20        |      | yes       |
| 36      | boric acid            |                            |  | H <sub>3</sub> BO <sub>3</sub>  | 1,4              |               |               | all, aqueous              | 100         |                      | 120       |               | 80   |               | 100       |      | yes       |
| 37      | bromine               |                            |  | Br <sub>2</sub>   | 3,1              | 58,8          |               | technically pure          | -           | 20                   | 60        |               | -  | 20            | 20        |      | see notes |
| 38      | bromine water         |                            |  | Br <sub>2</sub> .10H <sub>2</sub> O   | 2,0              | 6,8           |               | aqueous, saturated        | -           | 20                   | 100       |               | -  | 20            | 20        |      | see notes |
| 39      | butyl acetate         |                            | n  | CH <sub>3</sub> CO <sub>2</sub> -(CH <sub>2</sub> ) <sub>2</sub> -C <sub>2</sub> H <sub>5</sub> | 0,88             |               |               | technically pure          | (20)        |                      | 20        | (40)          | 20   | 40            | (20)      | 40   | yes       |
| 40      | butyl alcohol         | butanol                    | n  | C <sub>2</sub> H <sub>5</sub> -CH <sub>2</sub> -CH <sub>2</sub> OH                              | 0,81             | 118           |               | technically pure          | 40          | 80                   | 120       |               | 60   |               | 20        | 60   | yes       |
| 41      | butyric acid          | butanoic acid              | n  | C <sub>2</sub> H <sub>5</sub> -CH <sub>2</sub> -CO <sub>2</sub> H                               | 0,96             | -5,5          |               | technically pure          | 20          |                      | 120       |               | (20)   |               | (20)      |      | yes       |
| 42      | calcium bisulphite    |                            |  | Ca(HSO <sub>3</sub> ) <sub>2</sub>  | 1,6              |               |               | cold saturated, aqueous   | 80          |                      | 120       |               | 20   |               | 80        |      | yes       |
| 43      | calcium chloride      |                            |  | CaCl <sub>2</sub>   | 1,5*             |               |               | aqueous, saturated        | 100         |                      | 120       |               | 80   | (100)         | 100       |      | yes       |
| 44      | calcium hydroxide     |                            |  | Ca(OH) <sub>2</sub>   | 1,0*             |               |               | aqueous, saturated        | 60          |                      | 120       |               | 80   |               | 100       |      | see notes |
| 45      | calcium hypochloride  |                            |  | Ca(ClO) <sub>2</sub> .4H <sub>2</sub> O   | 1,9              |               |               | cold saturated, aqueous   | 60          |                      | 120       |               | 60   |               | 20        | 60   | see notes |
| 46      | calcium nitrate       |                            |  | Ca(NO <sub>3</sub> ) <sub>2</sub> .4H <sub>2</sub> O  | 1,3*             | 42,7          |               | 50%, aqueous              | 60          |                      | 120       |               | 60   |               | 80        |      | yes       |
| 47      | carbon disulphide     |                            |  | CS <sub>2</sub>   | 1,3              | 46,3          |               | technically pure          | (20)        |                      | 20        |               | -  | 20            | 20        |      | yes       |
| 48      | carbon tetrachloride  |                            |  | CCl <sub>4</sub>  | 1,6              | 76,8          |               | technically pure          | -           | 20                   | 120       |               | -  | 20            | 60        |      | yes       |
| 49      | chloracetic acid      | alfa                       | CICH <sub>2</sub> -CO-OH                         | 1,25*   | 65,8             |               |               | 50%, aqueous              | 60          |                      | 100       |               | (20)   |               | (20)      |      | yes       |
| 50      | chlorine water        |                            |  | Cl <sub>2</sub> .8H <sub>2</sub> O  | 1,2              | 9,5           |               | saturated                 | (20)        |                      | 100       |               | (20)   |               | (20)      |      | yes       |
| 51      | chlorosulphonic acid  |                            |  | HO.SO <sub>2</sub> .Cl  | 1,8              |               |               | technically pure          | -           | 20                   | 60        |               | -  | 20            | -         | 20   | see notes |
| 52      | chromic acid          |                            |  | CrO <sub>3</sub> .H <sub>2</sub> O  | 2,7              |               |               | up to 50%, aqueous        | -           | 20                   | 100       |               | (60)   | 60            | 60        |      | yes       |
| 53      | chromic acid          |                            |  |   | 1,7*             |               |               | 60%, aqueous              | -           | 20                   | 100       |               | (20)   |               | 40        | (60) | see notes |
| 54      | cresol                | methyl phenol              | m  | CH <sub>3</sub> -C <sub>6</sub> H <sub>4</sub> -OH  | 1,03             | 11,9          |               | cold saturated, aqueous   | 40          |                      | 100       | (120)         | -  | 20            | 40        |      | yes       |
| 55      | cupric chloride       |                            |  | CuCl <sub>2</sub>   | 3,1              |               |               | all, aqueous              | 20          | 60                   | 120       |               | 80   |               | 80        |      | yes       |
| 56      | cupric sulphate       |                            |  | CuSO <sub>4</sub> .5H <sub>2</sub> O  | 2,3              | 110           |               | all, aqueous              | 20          | 60                   | 120       |               | 80   |               | 80        |      | yes       |
| 57      | detergents            |                            |  |   |                  |               |               |                           | 80          |                      | 120       |               | 80   |               | 80        |      | yes       |
| 58      | dibutyl ketone        | iso                        | (C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub> CO | 0,81  |                  |               |               | technically pure          | (20)        | 40                   | 60        |               | (20)   | -             | 20        |      | yes       |
| 59      | dibutyl phthalate     |                            |  | C <sub>6</sub> H <sub>4</sub> (CO <sub>2</sub> C <sub>4</sub> H <sub>9</sub> ) <sub>2</sub>     | 1,05             |               |               | technically pure          | 20          | (60)                 | 40        | 60            | (20)   |               |           |      | yes       |
| 60      | dichlobenzene         | o                          | C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>    | 1,31  | -17,2            |               |               | technically pure          | (20)        |                      | 20        | (40)          | -  | 20            | 20        |      | yes       |
| 61      | dichloroacetic acid   |                            |  | Cl <sub>2</sub> CH-COO <sub>2</sub> H   | 1,56             | 9,7           |               | technically pure          | 20          |                      | 60        |               | 60   |               | 20        | 60   | yes       |
| 62      | dichloroethane        | ethylene chloride          |  | CH <sub>3</sub> -CHCl <sub>2</sub>  | 1,18             | 57,3          |               | technically pure          | 20          |                      | 120       |               | 60   |               | (40)      | 60   | yes       |
| 63      | dichloroethylene      | dichloethene               |  | CH <sub>2</sub> :CCl <sub>2</sub>   | 1,28             | 55            |               | technically pure          | (20)        |                      | 20        | (80)          | -  | 20            | (20)      |      | yes       |
| 64      | diesel fuel           |                            |  |   |                  |               |               |                           | (20)        |                      | 120       |               | -  | 20            | 40        |      | yes       |
| 65      | diethylamine          |                            |  | (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH  | 0,71             | 55,5          |               | technically pure          | 20          |                      | 20        | 60            | (20)   |               | -         | 20   | yes       |
| 66      | dimethylamine         |                            |  | (CH <sub>3</sub> ) <sub>2</sub> NH <sub>2</sub>   | 0,9              | 51            |               | technically pure          | 20          |                      | 20        | (40)          | (20)   |               | -         | 20   | yes       |
| 67      | ethyl acetate         | acetic ether               |  | CH <sub>3</sub> CO <sub>2</sub> -C <sub>2</sub> H <sub>5</sub>                                  | 0,9              | 77,2          |               | technically pure          | 20          | (60)                 | 40        | (80)          | (60)   | -             | 20        |      | yes       |
| 68      | ethyl alcohol         | ethanol                    |  | CH <sub>3</sub> -CH <sub>2</sub> OH   | 0,79             | 78,4          |               | technically pure, 96%     | 80          |                      | 120       |               | 80   |               | (60)      |      | yes       |
| 69      | ethyl ether           | alfa                       | (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> O  | 0,71  | 34,6             |               |               | technically pure          | 20          |                      | 40        |               | -  | 20            | -         | 20   | yes       |
| 70      | ethylene chloride     |                            |  | CICH <sub>2</sub> -CH <sub>2</sub> Cl   | 1,3              | 83,5          |               | technically pure          | (20)        |                      | 120       |               | (40)   | 60            | 40        | (60) | yes       |
| 71      | ethylene chlorohydrin | chloroethanol              |  | CICH <sub>2</sub> -CH <sub>2</sub> OH   | 1,20             |               |               | technically pure          | 20          | 60                   | 20        | (40)          | 20   |               | 40        |      | yes       |
| 72      | ethylene diamine      |                            |  | NH <sub>2</sub> -CH <sub>2</sub> -CH <sub>2</sub> -NH <sub>2</sub>                              | 0,9              | 8,5           |               | technically pure          | 20          |                      | 20        | (40)          | 60   |               | (40)      | 60   | yes       |

|         | <b>ARGAL pumps</b>           | TMR - ZMR        | Chemical Resistance List  |                                      |               |               |                              |           |               |           | GFR-PP (WR)   | CFF E-CTFE (GF - GX) | EPDM (E)      | FKM (V)   | int. structure (N - R - X) or mech. seals (SF1 - TS5/6) (MSFA-MTSCD) |           |
|---------|------------------------------|------------------|---|--------------------------------------|---------------|---------------|------------------------------|-----------|---------------|-----------|---------------|----------------------|---------------|-----------|--|-----------|
| Ref. N. | Medium                       | Synonymus        | Formula   | Specific gravity                     | Melting point | Boiling point | Concentration                | Resistant | Not Resistant | Resistant | Not Resistant | Resistant            | Not Resistant | Resistant | Not Resistant  | Resistant |
| 73      | ethylene glycol              | ethanediol       | OHCH <sub>2</sub> -CH <sub>2</sub> OH   | 1,1                                  | -15,6         |               | technically pure             | 100       |               | 120       |               | 60                   |               | 60        | (80)   | yes       |
| 74      | ferric chloride              |                  | FeCl <sub>3</sub> .6H <sub>2</sub> O  | 2,2                                  | 37            |               | all, aqueous                 | 80        |               | 120       |               | 80                   |               | 100       |  | yes       |
| 75      | ferric nitrate               |                  | Fe(NO <sub>3</sub> ) <sub>3</sub> .6H <sub>2</sub> O  | 1,7                                  | 35            |               | all, aqueous                 | 80        |               | 120       |               | 80                   |               | 100       |  | yes       |
| 76      | ferric sulphate              |                  | Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>   | 3,1                                  |               |               | all, aqueous                 | 80        |               | 120       |               | 80                   |               | 100       |  | yes       |
| 77      | fertilizer salts             |                  |   |                                      |               |               | aqueous                      | 60        |               | 120       |               | 60                   |               | 100       |  | yes       |
| 78      | fluoboric acid               |                  | HBF <sub>4</sub>  | 1,4*                                 | 37            |               | 50%, aqueous                 | -         | 20            | 60        |               | 60                   |               | 80        |  | yes       |
| 79      | fluosilicic acid             |                  | H <sub>2</sub> SiF <sub>6</sub>   | 1,3*                                 | 45            |               | 32%, aqueous                 | -         | 20            | 120       | (40)          | 60                   | -             | 20        | see notes  |           |
| 80      | formic acid                  | methanoic acid   | H-CO <sub>2</sub> H   | 1,22                                 | 8,4           | 101           | up to 50%, aqueous           | 20        | (60)          | 100       |               | 40                   | (60)          | 40        | 80*  | yes       |
| 81      | formic acid                  |                  |   |                                      |               |               | technically pure             | 20        | 60            | 100       |               | 60                   | (80)          | 20        |  | yes       |
| 82      | glycerol                     | glycerine        | CHOH(CH <sub>2</sub> OH) <sub>2</sub>   | 1,26                                 | 18,2          |               | technically pure             | 100       |               | 120       |               | 60                   | (80)          | 40        | 80*  | yes       |
| 83      | hydrazine                    |                  | N <sub>2</sub> H <sub>4</sub> .H <sub>2</sub> O   | 1,03                                 |               |               | aqueous                      | 20        |               | 20        | (60)          | 20                   |               | 20        |  | yes       |
| 84      | hydrobromic acid             |                  | HBr   | 1,5*                                 |               |               | 50%, aqueous                 | 60        |               | 120       |               | 40                   | 80            | 60        | 100  | yes       |
| 85      | hydrochloric acid            |                  | HCl   |                                      |               |               | 5%, aqueous                  | 60        | (80)          | 120       |               | 80                   |               | 80        |  | yes       |
| 86      | hydrochloric acid            |                  |   |                                      |               |               | 10%, aqueous                 | 40        | (80)          | 120       |               | 80                   |               | 80        |  | yes       |
| 87      | hydrochloric acid            |                  |   |                                      |               |               | 30%, aqueous                 | 20        | 80            | 120       |               | 40                   | (60)          | 40        | (60)   | yes       |
| 88      | hydrochloric acid            |                  |   | 1,2*                                 |               |               | 36%, aqueous                 | 20        | 60            | 120       |               | 20                   | 60            | 20        | 60*  | yes       |
| 89      | hydrocyanic acid             | hydrogen cyanide | HCN   | 0,7                                  | 25,7          |               | technically pure             | 60        |               | 120       |               | 20                   | (20)          | 20        | (20)   | yes       |
| 90      | hydrofluoric acid            |                  | HF  | 1,0                                  | 19,4          |               | up to 40%, aqueous           | 60        |               | 120       |               | -                    | 20            | 40        | (60)   | yes       |
| 91      | hydrofluoric acid            |                  |   |                                      |               |               | 50%, aqueous                 | 40        |               | 120       |               | -                    | 20            |           |  | yes       |
| 92      | hydrofluoric acid            |                  |   |                                      |               |               | 70%, aqueous                 | -         | 20            | 80        |               | -                    | 20            | 20        |  | see notes |
| 93      | hydrogen peroxide            |                  | H <sub>2</sub> O <sub>2</sub>   | 1,4                                  | -0,9          |               | 10%, aqueous                 | 40        |               | 40        |               | 20                   | 60            | 20        | 60*  | yes       |
| 94      | hydrogen peroxide            |                  |   |                                      |               |               | 30%, aqueous                 | 40        | (60)          | 40        |               | (20)                 | 40            | 40        | 80*  | yes       |
| 95      | hydrogen peroxide            |                  |   |                                      |               |               | 90%, aqueous                 | -         | 20            | 40        |               | (20)                 |               | (20)      |  | yes       |
| 96      | lactic acid                  | dl               | CH <sub>3</sub> -CHOH-CO <sub>2</sub> H   | 1,25                                 | 16,8          |               | 10%, aqueous                 | 100       |               | 60        |               | (60)                 | 80            | 20        | (80)   | yes       |
| 97      | lead acetate                 |                  | Pb(C <sub>2</sub> H <sub>5</sub> O <sub>2</sub> ) <sub>2</sub> .3H <sub>2</sub> O                   | 1,26*                                | 75            |               | aqueous, saturated           | 60        |               | 120       |               | 60                   |               | 60        |  | yes       |
| 98      | lithium bromide              |                  | LiBr.H <sub>2</sub> O   | 2,4                                  | 44            |               | all, aqueous                 | 40        |               | 60        |               | 20                   |               | 80        |  | yes       |
| 99      | lithium chloride             |                  | LiCl  | 2,1                                  |               |               | all, aqueous                 | (20)      |               | 60        |               | 20                   |               | 40        |  | yes       |
| 100     | magnesium chloride           |                  | MgCl <sub>2</sub> .6H <sub>2</sub> O  | 1,6                                  | 118           |               | all, aqueous                 | 100       |               | 120       |               | 80                   |               | 100       |  | yes       |
| 101     | manganese sulphate           | -oso             | MnSO <sub>4</sub> .4H <sub>2</sub> O  | 2,1                                  |               |               | all, aqueous                 | 100       |               | 120       |               | 80                   |               | 100       |  | yes       |
| 102     | methyl alcohol               | methanol         | CH <sub>3</sub> .OH   | 0,79                                 | 64,7          |               | all                          | 60        |               | 120       |               | 60                   | (60)          |           |  | yes       |
| 103     | methyl acetate               |                  | CH <sub>3</sub> CO <sub>2</sub> .CH <sub>3</sub>  | 0,93                                 | 57,3          |               | technically pure             | 40        | (60)          | 60        |               | (20)                 |               | -         | 20   | yes       |
| 104     | methyl ethyl ketone          | MEK              | CH <sub>3</sub> .CO-C <sub>2</sub> H <sub>5</sub>   | 0,81                                 | 79,6          |               | technically pure             | 20        | (40)          | 40        | (80)          | 20                   | (40)          | -         | 20   | yes       |
| 105     | mixed acids                  |                  | H <sub>2</sub> SO <sub>4</sub> .H <sub>3</sub> PO <sub>4</sub>                                      |                                      |               |               | 30% : 60% : H <sub>2</sub> O | 20        | (40)          | 100       |               | 40                   |               | 60        |  | yes       |
| 106     | mixed acids                  |                  | H <sub>2</sub> SO <sub>4</sub> .HNO <sub>3</sub>  |                                      |               |               | 50% : 50%                    | -         | 20            | 60        |               | (20)                 |               | -         | 20*  | see notes |
| 107     | mixed acids                  |                  | H <sub>2</sub> SO <sub>4</sub> .HNO <sub>3</sub>  |                                      |               |               | 10% : 87% : H <sub>2</sub> O | -         | 20            | 40        |               | -                    | 20            | -         | 20*  | see notes |
| 108     | mixed acids                  |                  | H <sub>2</sub> SO <sub>4</sub> .HNO <sub>3</sub>  |                                      |               |               | 50% : 33% : H <sub>2</sub> O | -         | 20            | 60        |               | (20)                 | 20            | 20        |  | yes       |
| 109     | mixed acids                  |                  | H <sub>2</sub> SO <sub>4</sub> .HNO <sub>3</sub>  |                                      |               |               | 10% : 20% : H <sub>2</sub> O | -         | 20            | 80        |               | 40                   |               | 60        |  | yes       |
| 110     | nickel sulphate              |                  | NiSO <sub>4</sub> .6H <sub>2</sub> O  | 1,25*                                | 53,3          |               | cold saturated, aqueous      | 60        |               | 120       |               | 80                   |               | 100       |  | yes       |
| 111     | nitric acid                  |                  | HNO <sub>3</sub>  | 1,5                                  | 86            |               | 6%, aqueous                  | 20        | (60)          | 120       |               | 40                   | (60)          | 40        | 80*  | yes       |
| 112     | nitric acid                  |                  |   |                                      |               |               | 40%, aqueous                 | 20        | 40            | 100       |               | 40                   | (60)          | 60        | (80)   | yes       |
| 113     | nitric acid                  |                  |   |                                      |               |               | 65%, aqueous                 | -         | 20            | 60        |               | -                    | 20            | 20        | 60*  | see notes |
| 114     | nitric acid                  |                  |   |                                      |               |               | 100%                         | -         | 20            | 40        | (80)          | -                    | 20            | -         | 20*  | see notes |
| 115     | nitrobenzene                 |                  | C <sub>6</sub> H <sub>5</sub> -NO <sub>2</sub>  | 1,20                                 | 5,7           |               | technically pure             | 40        |               | 40        | (80)          | -                    | 20            | (20)      |  | yes       |
| 116     | oleum                        |                  | H <sub>2</sub> SO <sub>4</sub> .SO <sub>3</sub>   | 1,86                                 |               |               | 10% SO <sub>3</sub>          | -         | 20            | 60        |               | -                    | 20            | (20)      |  | see notes |
| 117     | perchloric acid              | 73,6%            | HClO <sub>4</sub> .2H <sub>2</sub> O  | 1,7                                  | -17,8         |               | 10%, aqueous                 | 40        |               | 60        |               | 60                   | (80)          | 60        | (80)   | see notes |
| 118     | perchloric acid              |                  |   |                                      |               |               | 70%, aqueous                 | -         | 20            | 40        |               | 60                   | (80)          | 60        | (80)   | see notes |
| 119     | phenol                       | carbolic acid    | C <sub>6</sub> H <sub>5</sub> -OH   | 1,06                                 | 40,9          |               | 10%, aqueous                 | 40        |               | 80        | 100           | 60                   | (80)          | 60        | (80)   | yes       |
| 120     | phenol                       |                  |   |                                      |               |               | 90%, aqueous                 | 40        |               | 60        | (80)          | -                    | 20            | 20        | 60*  | yes       |
| 121     | phenyl hydrazine             |                  | C <sub>6</sub> H <sub>5</sub> -NH-NH <sub>2</sub>   | 1,10                                 | 19,6          |               | technically pure             | (20)      |               | 20        |               | (20)                 |               | 20        | (60)   | yes       |
| 122     | phosphoric acid              | orto             | H <sub>3</sub> PO <sub>4</sub>  | 1,12*                                | 42,4          |               | up to 30%, aqueous           | 60        |               | 120       |               | 80                   | (100)         | 100       |  | yes       |
| 123     | phosphoric acid              |                  |   |                                      | 1,48*         |               | 85%, aqueous                 | 60        |               | 120       |               | 60                   | (80)          | 80        | (100)  | see notes |
| 124     | phosphorus oxychloride       |                  | POCl <sub>3</sub>   | 1,7                                  | 1,2           |               | technically pure             | 20        | (60)          | 100       |               | 20                   |               | 20        |  | see notes |
| 125     | phosphorus pentoxide         |                  | P <sub>2</sub> O <sub>5</sub>   | 2,4                                  |               |               | technically pure             | 20        |               | 100       |               | 60                   |               | 60        |  | yes       |
| 126     | phosphorus trichloride       |                  | PCl <sub>3</sub>  | 1,6                                  |               | 76            | technically pure             | 20        | (60)          | 100       |               | 20                   |               | 20        |  | see notes |
| 127     | photographic solutions       |                  |   |                                      |               |               | commercial                   | 40        |               | 60        |               | 40                   |               | 40        |  | yes       |
| 128     | plating solutions            |                  | Cd ; Cr ; Au  |                                      |               |               |                              | -         | 20            | 100       |               | 20                   |               | 80        |  | yes       |
| 129     | plating solutions            |                  | Cu ; Pb ; Ni ; Rh ; Ag ; Sn ; Zn  |                                      |               |               |                              |           | 20            | 100       |               | 20                   |               | 80        |  | yes       |
| 130     | potassium carbonate          | potash           | K <sub>2</sub> CO <sub>3</sub>  | 2,3                                  |               |               | cold saturated, aqueous      | 60        |               | 120       |               | 40                   |               | 40        |  | yes       |
| 131     | potassium chlorate           |                  | KClO <sub>3</sub>   | 2,3                                  |               |               | cold saturated, aqueous      | 60        |               | 120       |               | 80                   |               | 100       |  | see notes |
| 132     | potassium chloride           |                  | KCl   | 2,0                                  |               |               | all, aqueous                 | 100       |               | 120       |               | 100                  |               | 100       |  | yes       |
| 133     | potassium chromate           |                  | K <sub>2</sub> CrO <sub>4</sub>   | 2,7                                  |               |               | cold saturated, aqueous      | 40        | (60)          | 120       |               | 60                   |               | 60        |  | yes       |
| 134     | potassium cyanide            |                  | KCN   | 1,5                                  |               |               | cold saturated, aqueous      | 60        |               | 120       |               | 80                   |               | 20        | 60   | yes       |
| 135     | potassium hydroxide          |                  | KOH   | 1,55*                                |               |               | 50%, aqueous                 | 80        |               | 120       |               | 60                   | (80)          | -         | 20   | see notes |
| 136     | potassium nitrate            |                  | KNO <sub>3</sub>  | 1,4*                                 |               |               | 50%, aqueous                 | 60        |               | 120       |               | 60                   |               | 60        |  | yes       |
| 137     | potassium perchlorate        |                  | KClO <sub>4</sub>   | 1,02*                                |               |               | cold saturated, aqueous      | 60        |               | 20        |               | 60                   |               | 80        |  | yes       |
| 138     | potassium permanganate       |                  | KMnO <sub>4</sub>   | 1,05*                                |               |               | cold saturated, aqueous      | 60        |               | 100       |               | 60                   |               | 80        |  | see notes |
| 139     | potassium-aluminium sulphate | alum K-Al        | K <sub>2</sub> SO <sub>4</sub> .Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub> .24H <sub>2</sub> O | 1,8                                  | 92            |               | 50%, aqueous                 | 60        |               | 120       |               | 100                  |               | 80        |  | yes       |
| 140     | potassium-chromium sulphate  | alum K-Cr        | K <sub>2</sub> SO <sub>4</sub> .Cr <sub>2</sub> O <sub>7</sub> .3.24H <sub>2</sub> O                | 1,8                                  | 89            |               | aqueous, cold saturated      | 60        |               | 60        |               | 60                   |               | 80        |  | yes       |
| 141     | propyl acetate               | iso              | CH <sub>3</sub> CO <sub>2</sub> .CH(CH <sub>3</sub> ) <sub>2</sub>                                  | 0,87                                 | 88,4          |               | technically pure             | -         | 20            | 40        | (80)          | 20                   |               | -         | 20   | yes       |
| 142     | propyl alcohol               | propanol         | iso   | (CH <sub>3</sub> ) <sub>2</sub> CHOH | 0,79          | 82,4          | technically pure             | 100       |               | 120       |               | 60                   | (80)          | 60        | (80)   | yes       |
| 143     | pyridine                     |                  |   | C <sub>5</sub> H <sub>5</sub> N      | 0,98          | 115,5         | technically pure             | (60)      |               | -         | 20            | 20                   | 60            | (20)      | 40   | yes       |
| 144     | silver nitrate               |                  |   | AgNO <sub>3</sub>                    | 2,2*          |               | cold saturated, aqueous      | 60        |               | 120       |               | 60                   |               | 60        |  | yes       |

|         | <b>ARGAL pumps</b>          | TMR - ZMR               |       | Chemical Resistance List  |                  |               |               |                                | GFR-PP (WR) |               | CFF E-CTFE (GF - GX) |               | EPDM (E)  |               | FKM (V)   |               | int. structure (N - R - X) or mech. seals (SF1 - TS5/6) (MSFA-MTSC/D) |
|---------|-----------------------------|-------------------------|-------|---|------------------|---------------|---------------|--------------------------------|-------------|---------------|----------------------|---------------|-----------|---------------|-----------|---------------|---|
| Ref. N. | Medium                      | Synonymus               |       | Formula   | Specific gravity | Melting point | boiling point | Concentration                  | Resistant   | Not Resistant | Resistant            | Not Resistant | Resistant | Not Resistant | Resistant | Not Resistant | Resistant   |
| 145     | sodium acetate              |                         |       | NaC <sub>2</sub> H <sub>3</sub> O <sub>2</sub>                                    | 1,5              |               |               | all, aqueous                   | 100         |               | 120                  |               | 60        | (80)          | 60        | (80)          | yes   |
| 146     | sodium bisulphate           |                         |       | NaHSO <sub>4</sub>  | 1,1*             |               |               | 10%, aqueous                   | 60          |               | 120                  |               | 60        | (80)          | 100       |               | yes   |
| 147     | sodium bisulphite           |                         |       | NaHSO <sub>3</sub>  | 1,5              | 5             |               | all, aqueous                   | 60          |               | 120                  |               | 60        | 100           | (20)      | 40            | yes   |
| 148     | sodium bromate              |                         |       | NaBrO <sub>3</sub>  | 3,3              |               |               | all, aqueous                   | 20          | (40)          | 100                  |               | 60        |               | 60        |               | yes   |
| 149     | sodium bromide              |                         |       | NaBr  | 3,2              |               |               | all, aqueous                   | 60          |               | 120                  |               | 60        |               | 80        |               | yes   |
| 150     | sodium carbonate            | soda                    |       | Na <sub>2</sub> CO <sub>3</sub>   | 1,2*             |               |               | cold saturated, aqueous        | 100         |               | 120                  |               | 80        |               | 60        |               | yes   |
| 151     | sodium chloride             |                         |       | NaCl  | 2,2              |               |               | all, aqueous                   | 80          |               | 120                  |               | 80        | (100)         | 100       |               | yes   |
| 152     | sodium chromate             |                         |       | Na <sub>2</sub> CrO <sub>4</sub>  | 2,7              |               |               | diluted, aqueous               | 20          | (40)          | 80                   |               | 60        |               | 60        |               | yes   |
| 153     | sodium hydroxide            |                         |       | NaOH  | 2,13             | 318           |               | up to 10%, aqueous             | 100         |               | 120                  |               | 60        |               | (60)      |               | yes   |
| 154     | sodium hydroxide            |                         |       |   |                  |               |               | up to 40%, aqueous             | 80          |               | 100                  |               | 60        |               | (20)      | 40            | yes   |
| 155     | sodium hydroxide            |                         |       |   | 1,55*            |               |               | 50%, aqueous                   | 80          |               | 100                  |               | 40        | (60)          | -         | 20            | see notes   |
| 156     | sodium hypochlorite         |                         |       | NaOCl   | 1,2*             | 6             |               | 12,5% active chlorine, aqueous | -           | 20            | 120                  |               | 20        |               | 20        |               | see notes   |
| 157     | sodium nitrate              |                         |       | NaNO <sub>3</sub>   | 1,4*             |               |               | cold saturated, aqueous        | 60          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 158     | sodium phosphate            | neutro                  |       | Na <sub>3</sub> PO <sub>4</sub> .12H <sub>2</sub> O                               | 1,6              | 73,4          |               | cold saturated, aqueous        | 80          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 159     | sodium sulphate             | Glauber salt            |       | Na <sub>2</sub> SO <sub>4</sub> .10H <sub>2</sub> O                               | 1,5              | 32,4          |               | cold saturated, aqueous        | 80          |               | 120                  |               | 40        | (60)          | 80        |               | yes   |
| 160     | sodium sulphide             |                         |       | Na <sub>2</sub> S.9H <sub>2</sub> O   | 1,4              | 50            |               | cold saturated, aqueous        | 60          |               | 120                  |               | 60        |               | -         | 20            | yes   |
| 161     | sodium sulphite             |                         |       | Na <sub>2</sub> SO <sub>3</sub>   | 1,15*            |               |               | cold saturated, aqueous        | 40          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 162     | sodium thiosulphate         |                         |       | Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> .5H <sub>2</sub> O                  | 1,7              | 48            |               | cold saturated, aqueous        | 60          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 163     | spinning bath acids (+ CS2) |                         |       |   |                  |               |               | CS2 : 500 mg/l                 | 20          |               | 60                   |               | (40)      |               | 40        |               | yes   |
| 164     | stannous chloride           |                         |       | SnCl <sub>2</sub> .2H <sub>2</sub> O  | 2,4*             | 37,7          |               | cold saturated, aqueous        | 60          |               | 120                  |               | 20        | 60            | 60        |               | yes   |
| 165     | sulfuric acid               |                         |       | H <sub>2</sub> SO <sub>4</sub>  | 1,84             | 10,4          |               | up to 40%, aqueous             | 60          |               | 120                  |               | 60        | 100           | 60        | 100           | yes   |
| 166     | sulfuric acid               |                         |       |   | 1,7*             |               |               | 80%, aqueous                   | 20          | 60            | 120                  |               | 20        | 60            | 40        | 80            | yes   |
| 167     | sulfuric acid               |                         |       |   |                  |               |               | 90%, aqueous                   | -           | 20            | 120                  |               | (20)      | 40            | 40        |               | see notes   |
| 168     | sulfuric acid               |                         |       |   |                  |               |               | 98%, aqueous                   | -           | 20            | 120                  |               | -         | 20            | 40        |               | see notes   |
| 169     | tetrachloro ethane          | acetylene tetrachloride | sim   | Cl <sub>2</sub> CH-CHCl <sub>2</sub>  | 1,6              |               |               | technically pure               | (20)        |               | 40                   |               | -         | 20            | (20)      |               | yes   |
| 170     | tetrachloro ethylene        | perchloroethylene       |       | Cl <sub>2</sub> C:CCl <sub>2</sub>  | 1,63             | 121,2         |               | technically pure               | (20)        |               | 20                   |               | -         | 20            | 60        |               | yes   |
| 171     | toluene                     | methyl benzene          |       | CH <sub>3</sub> -C <sub>6</sub> H <sub>5</sub>                                    | 0,9              | 110,6         |               | technically pure               | (20)        | 40            | 40                   | (80)          | -         | 20            | (20)      | 40            | yes   |
| 172     | trichloro ethane            | methyl chloroform       |       | CH <sub>3</sub> -CCl <sub>3</sub>   | 1,35             | 74            |               | technically pure               | (20)        |               | 40                   | (40)          | -         | 20            | 20        |               | yes   |
| 173     | trichloro ethylene          | ethylene trichloride    |       | CICH:CCl <sub>2</sub>   | 1,5              | 87,2          |               | technically pure               | (20)        |               | 20                   | (40)          | -         | 20            | 20        |               | yes   |
| 174     | trichloro methane           | chloroform              | 1.1.1 | CHCl <sub>3</sub>   | 1,5              | 61,2          |               | technically pure               | (20)        |               | 100                  |               | -         | 20            | (20)      |               | yes   |
| 175     | triethanol amine            |                         |       | N(CH <sub>2</sub> -CH <sub>2</sub> -OH) <sub>3</sub>                              | 1,13             | 20            |               | technically pure               | 20          |               | 20                   | (40)          | -         | 20            | 20        |               | yes   |
| 176     | triethyl amine              |                         |       | (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> N                                   | 0,7              | 89,4          |               | technically pure               | -           | 20            | 40                   | (80)          | -         | 20            | 40        |               | yes   |
| 177     | urea                        | carbamide               |       | NH <sub>2</sub> -CO-NH <sub>2</sub>   | 1,34             | 133           |               | up to 30%, aqueous             | 60          |               | 100                  |               | 60        |               | 60        |               | yes   |
| 178     | water                       |                         |       | H <sub>2</sub> O  | 1                | 0             | 100           | distilled, deionised           | 100         |               | 120                  |               | 80        |               | 100       |               | yes   |
| 179     | xilene                      | dimethyl benzene        | m     | C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub>                     | 0,9              |               |               | technically pure               | -           | 20            | 40                   | (80)          | -         | 20            | 20        | 60            | yes   |
| 180     | zinc acetate                |                         |       | Zn(C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ) <sub>2</sub> .2H <sub>2</sub> O | 1,7              | 100           |               | all, aqueous                   | 60          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 181     | zinc chloride               |                         |       | ZnCl <sub>2</sub>   | 2,9              |               |               | all, aqueous                   | 60          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 182     | zinc nitrate                |                         |       | Zn(NO <sub>3</sub> ) <sub>2</sub> .6H <sub>2</sub> O                              | 2,1              | 36,4          |               | all, aqueous                   | 60          |               | 120                  |               | 60        |               | 60        |               | yes   |
| 183     | zinc sulphate               |                         |       | ZnSO <sub>4</sub> .7H <sub>2</sub> O  | 2,0              | 39            |               | all, aqueous                   | 60          |               | 120                  |               | 60        |               | 60        |               | yes   |

Do not exceed the limit of the admitted temperatures of the pump version given in the range catalogue; "Resistant" strictly refers to chemical properties (not mechanical properties)

|   |   |  |     |     |     |     |     |
|---|---|--|-----|-----|-----|-----|-----|
| <b>30</b>   | : limit of temperature (in °C) at which the material is "Resistant"               | Specific weight: normally refers to the chemical as indicated in formula (liquid or solid); 1,5* refers to specified concentration; if "saturated" referred at 20 °C. boiling and melting points: refer to chemical as indicated in formula. |     |     |     |     |     |
| <b>30..</b>   | : limit of temperature (in °C) at which the material is "Not Resistant"           |  |     |     |     |     |     |
| <b>(30)</b>   | : limit of temperature (in °C) at which the material is "Conditionally Resistant" |  |     |     |     |     |     |
| <b>(-)</b>  | : does not exist temperature at which the material is "Resistant"                 |  |     |     |     |     |     |
| <b>[ ]</b>  | : empty space does not give any deductive information                             |  |     |     |     |     |     |
| <b>[ .. ]</b>   | : empty space does not give any deductive information                             |  |     |     |     |     |     |
| Temperature scale correlation (°C Celsius degree - °F Fahrenheit degree): |   |  |     |     |     |     |     |
| °C  | 20  | 40   | 60  | 80  | 100 | 120 | 140 |
| °F  | 68  | 104  | 140 | 176 | 212 | 248 | 284 |
| °F  | 70  | 110  | 140 | 170 | 210 | 250 | 280 |
| °C  | 21  | 43   | 60  | 77  | 99  | 121 | 138 |

| NOTES   |                          |   | ref.N   |
|---|--------------------------|---|---|
| <b>CARBOGRAPHITE</b><br>R1 - R2                               | Not applicable           | Bromine / Fluorine                                    | 37 - 38   |
|   | Not applicable           | Alkaline chlorate and hypochlorites                   | 45 - 131 - 156                                  |
|   | Unadvised                | Concentrated (Cr, F, N, S, Cl+S) acid                 | 51 - 53 - 92 - 106-107- 113-114 - 116 - 167-168 |
|   | Unadvised                | (P, Sb)-chloride compounds;                           | 28 - 124 - 126 - 138                            |
|   | Not applicable           | Cold oversaturated solutions of alkalies and salts    | 31 - 44 - 135 - 155                             |
|   | Unadvised                | Liquid with solid particles                           |   |
| <b>ALUMINA Ceramic</b><br>N1 - R1 - X1<br>SF1-TS5-MSFA-MTSC/D | Risk of explosion !      | Perchloric acid                                       | 117 - 118                                       |
|   | Not applicable           | Concentrated hot hydrofluoric / phosphoric acid       | 92 - 123  |
|   | Unadvised                | Concentrated hot strong alkalies                      | 19 - 31 - 44 - 135 - 155                        |
| <b>SILICON CARBIDE</b><br>X1 - N2 - R2 - X2<br>TS6-MTSD       | Conditionally applicable | Concentrated hot hydrofluoric acid                    | 92  |
| PTFE (glass fibre filled)<br>N1 - N2<br>SF1 - MSFA            | Unadvised                | Concentrated hot hydrofluoric acid; ammonium fluoride | 17 - 92   |
|   | Unadvised                | Liquid with solid particles                           |   |
| <b>FFKM</b>   | Unadvised                | Hot fluosilicic acid                                  | 79  |
|   | Unadvised                | Concentrated perchloric acid                          | 118   |

This Chemical Resistance List has to be intended as a guide in order to help the choice of materials better resistant to the handled chemical.  
No guarantees can be given in respect of the shown data, subject to be revised in the light of further empirical knowledge.