

Oasys



Oasys GSA

Output Data References

Oasys

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Oasys GSA

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Introduction

The following is a complete list of data options available to GSA Graphic Views and Output Views. Not all of this data is handled by the GSA COM interface 'Output' family of functions. Typically data is available via the Output functions if it can be contoured in GSA or can be output in a regular Output View table, (i.e. a table for which the summary of Maxima and Minima are available) (e.g. Nodal Displacements, but not Total Loads and Reactions) The vast majority of data options are available via the COM Output functions; most of the remainder are available via the COM GwaCommand function.

The Output_Init COM function requires an integer Data Reference as an argument, iDataRef. The DataReference to be used to access a particular item of data is deduced as follows:

A table consists of a header followed by several components. In the list below, table headers are assigned reference numbers; components are implicitly numbered consecutively following the header e.g.

Nodes table header: REF_NODE = 1002000

so Node X coordinate: REF_NODE_Z = REF_NODE + 4 = 1002004

Results marked "not available via COM Output" apply to the entire result type; e.g. in case of REF_RESP_DET, none of the types from REF_RESP_DET through to REF_RESP_DET_ETA are available via COM.

enum DataRef

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{
// not available via COM Output
    REF_NO_DATA                                = 0,

// not available via COM Output
    REF_TITLES                                = 1000,

// not available via COM Output
    REF_MODEL_HISTORY                          = 1100,

// not available via COM Output
    REF_ENV_IMPACT_SUM                          = 1200,

// not available via COM Output
```

```
REF_ANAL_TASK = 1400,  
  
// not available via COM Output  
REF_COMB_CASE = 1500,  
  
// not available via COM Output  
REF_PERM_FACT = 1600,  
  
// not available via COM Output  
REF_ALL_INPUT_DATA = 2000,  
  
REF_FIRST_MODEL  
  
REF_FIRST_GR_ENT  
  
REF_EL_1D_SHAPE = 801000,  
REF_EL_1D_SHAPE_PER_LEN ,  
REF_EL_1D_SHAPE_AREA_PER_LEN ,  
  
REF_EL_2D_SHAPE = 802000,  
REF_EL_2D_SHAPE_ANG ,  
REF_EL_2D_SHAPE_WARP ,  
REF_EL_2D_SHAPE_PROJ_AX ,  
  
REF_LAST_GR_ENT  
  
REF_AXIS = 1001000,  
REF_AXIS_NAME ,  
REF_AXIS_TYPE ,  
REF_AXIS_OX ,  
REF_AXIS_OY ,  
REF_AXIS_OZ ,  
REF_AXIS_XX ,
```

```
REF_AXIS_XY      ,
REF_AXIS_XZ      ,
REF_AXIS_XYX     ,
REF_AXIS_XYY     ,
REF_AXIS_XYZ     ,

REF_NODE         = 1002000,
REF_NODE_NAME    ,
REF_NODE_X       ,
REF_NODE_Y       ,
REF_NODE_Z       ,
REF_NODE_COOR    ,
REF_NODE_AXIS    ,
REF_NODE_RESTR   ,
REF_NODE_GEN_RESTR ,
REF_NODE_STF     ,

REF_SUPT         = 1003000,
REF_SUPT_AXIS    ,
REF_SUPT_RESTR   ,
REF_SUPT_STF_TRANS_X ,
REF_SUPT_STF_TRANS_Y ,
REF_SUPT_STF_TRANS_Z ,
REF_SUPT_STF_TRANS_VECT ,
REF_SUPT_STF_ROT_XX ,
REF_SUPT_STF_ROT_YY ,
REF_SUPT_STF_ROT_ZZ ,
REF_SUPT_STF_ROT_VECT ,

REF_ELEM        = 1011000,
REF_ELEM_NAME    ,
REF_ELEM_TYPE    ,
REF_ELEM_PROP    ,
```

```
REF_ELEM_GROUP      ,
REF_ELEM_NODE       ,
REF_ELEM_ANGLE      ,
REF_ELEM_VERT       ,
REF_ELEM_LEN        ,
REF_ELEM_TOPO       ,

REF_ELEM_RLS        = 1012000,
REF_ELEM_RLS_X      ,
REF_ELEM_RLS_Y      ,
REF_ELEM_RLS_Z      ,
REF_ELEM_RLS_XX     ,
REF_ELEM_RLS_YY     ,
REF_ELEM_RLS_ZZ     ,

REF_ELEM_OFFSET     = 1013000,
REF_ELEM_OFFSET_X   ,
REF_ELEM_OFFSET_Y   ,
REF_ELEM_OFFSET_Z   ,
REF_ELEM_OFFSET_VECT ,

REF_ELEM_DC         = 1014000,
REF_ELEM_DC_XX      ,
REF_ELEM_DC_XY      ,
REF_ELEM_DC_XZ      ,
REF_ELEM_DC_X       ,
REF_ELEM_DC_YX      ,
REF_ELEM_DC_YY      ,
REF_ELEM_DC_YZ      ,
REF_ELEM_DC_Y       ,
REF_ELEM_DC_ZX      ,
REF_ELEM_DC_ZY      ,
REF_ELEM_DC_ZZ      ,
```

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REF_ELEM_DC_Z ,
REF_MEMB = 1021000,
REF_MEMB_NAME ,
REF_MEMB_TYPE ,
REF_MEMB_PROP ,
REF_MEMB_DES_PROP ,
REF_MEMB_REST_PROP ,
REF_MEMB_BAR_LAYOUT_LEFT ,
REF_MEMB_BAR_LAYOUT_MIDDLE ,
REF_MEMB_BAR_LAYOUT_RIGHT ,
REF_MEMB_GROUP ,
REF_MEMB_NODE ,
REF_MEMB_ANGLE ,
REF_MEMB_VERT ,
REF_MEMB_LEN ,
REF_MEMB_TOPO ,
REF_MEMB_RLS = 1022000,
REF_MEMB_RLS_X ,
REF_MEMB_RLS_Y ,
REF_MEMB_RLS_Z ,
REF_MEMB_RLS_XX ,
REF_MEMB_RLS_YY ,
REF_MEMB_RLS_ZZ ,
REF_MEMB_OFFSET = 1023000,
REF_MEMB_OFFSET_X ,
REF_MEMB_OFFSET_Y ,
REF_MEMB_OFFSET_Z ,
REF_MEMB_OFFSET_VECT ,
REF_RC_BEAM = 1025000,
```

```
REF_RC_BEAM_MEMB ,
REF_RC_BEAM_SUP_FIX ,
REF_RC_BEAM_LWR_SEC ,
REF_RC_BEAM_LWR_LEN ,
REF_RC_BEAM_LWR_FIX ,
REF_RC_BEAM_UPR_SEC ,
REF_RC_BEAM_UPR_LEN ,
REF_RC_BEAM_UPR_FIX ,

REF_GRID_PLANE = 1031000,
REF_GRID_PLANE_NAME ,
REF_GRID_PLANE_TYPE ,
REF_GRID_PLANE_AXIS ,
REF_GRID_PLANE_ELEV ,
REF_GRID_PLANE_STOREY_NUM ,
REF_GRID_PLANE_BELOW ,
REF_GRID_PLANE_ABOVE ,
REF_GRID_PLANE_LIST ,
REF_GRID_PLANE_TOL ,
REF_GRID_PLANE_SPAN_TYPE ,
REF_GRID_PLANE_SPAN_ANG ,
REF_GRID_PLANE_EXPANSION ,
REF_GRID_PLANE_AREA ,

//REF_STOREY = 1032000,
// REF_STOREY_NAME ,
// REF_STOREY_ELEV ,
// REF_STOREY_ABOVE ,
// REF_STOREY_BELOW ,

REF_POLYLINE_2D = 1033000,
REF_POLYLINE_2D_NAME ,
REF_POLYLINE_2D_PERIM ,
```

```
REF_POLYLINE_2D_AREA      ,
REF_POLYLINE_2D_CENTRE_X  ,
REF_POLYLINE_2D_CENTRE_Y  ,
REF_POLYLINE_2D_X         ,
REF_POLYLINE_2D_Y         ,
REF_POLYLINE_2D_LENGTH    ,
```

REF_FIRST_GR_PROP

```
REF_ND_SPR_STF           = 1041000,
REF_ND_SPR_STF_TRANS_X   ,
REF_ND_SPR_STF_TRANS_Y   ,
REF_ND_SPR_STF_TRANS_Z   ,
REF_ND_SPR_STF_TRANS_VECT ,
REF_ND_SPR_STF_ROT_XX     ,
REF_ND_SPR_STF_ROT_YY     ,
REF_ND_SPR_STF_ROT_ZZ     ,
REF_ND_SPR_STF_ROT_VECT   ,
```

```
REF_EL_MAT              = 1041500,
REF_EL_MAT_E            ,
REF_EL_MAT_NU           ,
REF_EL_MAT_G            ,
REF_EL_MAT_RHO          ,
REF_EL_MAT_ALPHA        ,
REF_EL_MAT_DAMP         ,
```

```
REF_EL_PROP_BEAM       = 1042000,
REF_EL_PROP_BEAM_AREA   ,
REF_EL_PROP_BEAM_IYY    ,
REF_EL_PROP_BEAM_IZZ    ,
REF_EL_PROP_BEAM_TORS   ,
REF_EL_PROP_BEAM_KY     ,
```

REF_EL_PROP_BEAM_KZ	,
REF_EL_PROP_BEAM_A_KY	,
REF_EL_PROP_BEAM_A_KZ	,
REF_EL_PROP_BEAM_E_A	,
REF_EL_PROP_BEAM_E_IYY	,
REF_EL_PROP_BEAM_E_IZZ	,
REF_EL_PROP_BEAM_G_J	,
REF_EL_PROP_BEAM_G_A_KY	,
REF_EL_PROP_BEAM_G_A_KZ	,
REF_EL_PROP_BEAM_MOD	= 1042500,
REF_EL_PROP_BEAM_MOD_AREA	,
REF_EL_PROP_BEAM_MOD_IYY	,
REF_EL_PROP_BEAM_MOD_IZZ	,
REF_EL_PROP_BEAM_MOD_TORS	,
REF_EL_PROP_BEAM_MOD_KY	,
REF_EL_PROP_BEAM_MOD_KZ	,
REF_EL_PROP_MASS	= 1043000,
REF_EL_PROP_MASS_MASS	,
REF_EL_PROP_2DEL	= 1044000,
REF_EL_PROP_2DEL_THK	,
REF_EL_PROP_2DEL_BENDING	,
REF_EL_PROP_2DEL_INPLANE	,
REF_EL_PROP_2DEL_WEIGHT	,
REF_EL_PROP_2DEL_MASS	,
REF_EL_ENV_IMPACT_1D	= 1051000,
REF_EL_ENV_IMPACT_1D_E_A	,
REF_EL_ENV_IMPACT_1D_CO2_A	,
REF_EL_ENV_IMPACT_1D_CO2_B	,
REF_EL_ENV_IMPACT_1D_CO2_C	,

```

REF_EL_ENV_IMPACT_1D_CO2_D      ,
REF_EL_ENV_IMPACT_1D_RC        ,
REF_EL_ENV_IMPACT_1D_USER      ,

REF_EL_ENV_IMPACT_2D           = 1051100,
REF_EL_ENV_IMPACT_2D_E_A       ,
REF_EL_ENV_IMPACT_2D_CO2_A     ,
REF_EL_ENV_IMPACT_2D_CO2_B     ,
REF_EL_ENV_IMPACT_2D_CO2_C     ,
REF_EL_ENV_IMPACT_2D_CO2_D     ,
REF_EL_ENV_IMPACT_2D_RC        ,
REF_EL_ENV_IMPACT_2D_USER      ,

REF_EL_ENV_IMPACT_MEMB         = 1051200,
REF_EL_ENV_IMPACT_MEMB_E_A     ,
REF_EL_ENV_IMPACT_MEMB_CO2_A   ,
REF_EL_ENV_IMPACT_MEMB_CO2_B   ,
REF_EL_ENV_IMPACT_MEMB_CO2_C   ,
REF_EL_ENV_IMPACT_MEMB_CO2_D   ,
REF_EL_ENV_IMPACT_MEMB_RC      ,
REF_EL_ENV_IMPACT_MEMB_USER    ,

REF_LAST_GR_PROP

REF_MAT_STD                     = 1061000,
REF_MAT_STD_NAME                ,
REF_MAT_STD_TYPE                ,
REF_MAT_STD_E                   ,
REF_MAT_STD_NU                  ,
REF_MAT_STD_G                   ,
REF_MAT_STD_RHO                 ,
REF_MAT_STD_ALPHA               ,
REF_MAT_STD_DAMP                ,

```

// not available via COM Output

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REF_MAT_USER = 1062000,
    REF_MAT_USER_NAME ,
    REF_MAT_USER_TYPE ,
    REF_MAT_USER_E ,
    REF_MAT_USER_NU ,
    REF_MAT_USER_G ,
    REF_MAT_USER_RHO ,
    REF_MAT_USER_ALPHA ,
    REF_MAT_USER_DAMP ,

REF_PROP_BEAM = 1071000,
    REF_PROP_BEAM_NAME ,
    REF_PROP_BEAM_MAT ,
    REF_PROP_BEAM_DESC ,
    REF_PROP_BEAM_MOD ,
    REF_PROP_BEAM_AREA ,
    REF_PROP_BEAM_IYY ,
    REF_PROP_BEAM_IZZ ,
    REF_PROP_BEAM_IYZ ,
    REF_PROP_BEAM_TORS ,
    REF_PROP_BEAM_KY ,
    REF_PROP_BEAM_KZ ,
    REF_PROP_BEAM_TYPE ,
    REF_PROP_BEAM_COST ,

REF_PROP_BEAM_DEFN = 1071200,
    REF_PROP_BEAM_DEFN_NAME ,
    REF_PROP_BEAM_DEFN_DESC ,
    REF_PROP_BEAM_DEFN_AREA_BASE ,
    REF_PROP_BEAM_DEFN_AREA_MOD ,
    REF_PROP_BEAM_DEFN_IYY_BASE ,
```

```
REF_PROP_BEAM_DEFN_IYY_MOD ,
REF_PROP_BEAM_DEFN_IZZ_BASE ,
REF_PROP_BEAM_DEFN_IZZ_MOD ,
REF_PROP_BEAM_DEFN_TORS_BASE ,
REF_PROP_BEAM_DEFN_TORS_MOD ,
REF_PROP_BEAM_DEFN_KY_BASE ,
REF_PROP_BEAM_DEFN_KY_MOD ,
REF_PROP_BEAM_DEFN_KZ_BASE ,
REF_PROP_BEAM_DEFN_KZ_MOD ,
REF_PROP_BEAM_DEFN_MOD_MASS ,
REF_PROP_BEAM_DEFN_STRS_CALC ,

REF_PROP_BEAM_SUM = 1071400,
REF_PROP_BEAM_SUM_NAME ,
REF_PROP_BEAM_SUM_DESC ,
REF_PROP_BEAM_SUM_EL_NUM ,
REF_PROP_BEAM_SUM_EL_LEN ,
REF_PROP_BEAM_SUM_EL_MASS ,
REF_PROP_BEAM_SUM_EL_SURF ,
REF_PROP_BEAM_SUM_EL_COST ,
REF_PROP_BEAM_SUM_MB_NUM ,
REF_PROP_BEAM_SUM_MB_LEN ,
REF_PROP_BEAM_SUM_MB_MASS ,
REF_PROP_BEAM_SUM_MB_SURF ,
REF_PROP_BEAM_SUM_MB_COST ,

REF_PROP_BEAM_EXT = 1071600,
REF_PROP_BEAM_EXT_NAME ,
REF_PROP_BEAM_EXT_DESC ,
REF_PROP_BEAM_EXT_REF_PT ,
REF_PROP_BEAM_EXT_AREA ,
REF_PROP_BEAM_EXT_IYY ,
REF_PROP_BEAM_EXT_IZZ ,
```

```
REF_PROP_BEAM_EXT_IYZ ,
REF_PROP_BEAM_EXT_IUU ,
REF_PROP_BEAM_EXT_IVV ,
REF_PROP_BEAM_EXT_ANGLE ,
REF_PROP_BEAM_EXT_KY ,
REF_PROP_BEAM_EXT_KZ ,
REF_PROP_BEAM_EXT_J ,
REF_PROP_BEAM_EXT_CTOR ,
REF_PROP_BEAM_EXT_ZY ,
REF_PROP_BEAM_EXT_ZZ ,
REF_PROP_BEAM_EXT_ZPY ,
REF_PROP_BEAM_EXT_ZPZ ,
REF_PROP_BEAM_EXT_CY ,
REF_PROP_BEAM_EXT_CZ ,
REF_PROP_BEAM_EXT_RY ,
REF_PROP_BEAM_EXT_RZ ,
REF_PROP_BEAM_EXT_MASS ,
REF_PROP_BEAM_EXT_PERIM ,

REF_PROP_SPR = 1073000,
REF_PROP_SPR_NAME ,
REF_PROP_SPR_AXIS ,
REF_PROP_SPR_TYPE ,
REF_PROP_SPR_REF_X ,
REF_PROP_SPR_KX ,
REF_PROP_SPR_REF_Y ,
REF_PROP_SPR_KY ,
REF_PROP_SPR_REF_Z ,
REF_PROP_SPR_KZ ,
REF_PROP_SPR_MATRIX ,
REF_PROP_SPR_DAMP ,
```

// not available via COM Output

```
REF_PROP_NLSPRING_CURVE           = 1073500,

REF_PROP_SPRMAT                   = 1073600,
    REF_PROP_SPRMAT_NAME           ,
    REF_PROP_SPRMAT_K11            ,
    REF_PROP_SPRMAT_K12            ,
    REF_PROP_SPRMAT_K13            ,
    REF_PROP_SPRMAT_K14            ,
    REF_PROP_SPRMAT_K15            ,
    REF_PROP_SPRMAT_K16            ,
    REF_PROP_SPRMAT_K22            ,
    REF_PROP_SPRMAT_K23            ,
    REF_PROP_SPRMAT_K24            ,
    REF_PROP_SPRMAT_K25            ,
    REF_PROP_SPRMAT_K26            ,
    REF_PROP_SPRMAT_K33            ,
    REF_PROP_SPRMAT_K34            ,
    REF_PROP_SPRMAT_K35            ,
    REF_PROP_SPRMAT_K36            ,
    REF_PROP_SPRMAT_K44            ,
    REF_PROP_SPRMAT_K45            ,
    REF_PROP_SPRMAT_K46            ,
    REF_PROP_SPRMAT_K55            ,
    REF_PROP_SPRMAT_K56            ,
    REF_PROP_SPRMAT_K66            ,

REF_PROP_MASS                     = 1075000,
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    REF_PROP_MASS_AXIS             ,
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    REF_PROP_MASS_IXX              ,
    REF_PROP_MASS_IYY              ,
    REF_PROP_MASS_IZZ              ,
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REF_PROP_MASS_IXY      ,
REF_PROP_MASS_IYZ      ,
REF_PROP_MASS_IZX      ,
REF_PROP_MASS_ADD_X    ,
REF_PROP_MASS_ADD_Y    ,
REF_PROP_MASS_ADD_Z    ,

REF_PROP_2DEL          = 1076000,
REF_PROP_2DEL_NAME     ,
REF_PROP_2DEL_AXIS     ,
REF_PROP_2DEL_TYPE     ,
REF_PROP_2DEL_MAT      ,
REF_PROP_2DEL_THICK    ,
REF_PROP_2DEL_BENDING  ,
REF_PROP_2DEL_INPLANE  ,
REF_PROP_2DEL_WEIGHT   ,
REF_PROP_2DEL_SUPT_PAT ,
REF_PROP_2DEL_REF_EDGE ,
REF_PROP_2DEL_MASS     ,

REF_PROP_LINK          = 1077000,
REF_PROP_LINK_NAME     ,
REF_PROP_LINK_TYPE     ,

REF_PROP_CABLE         = 1078000,
REF_PROP_CABLE_NAME    ,
REF_PROP_CABLE_STIFF   ,
REF_PROP_CABLE_MASS    ,
REF_PROP_CABLE_ALPHA   ,
REF_PROP_CABLE_DAMP    ,

REF_PROP_SPACE         = 1079000,
REF_PROP_SPACE_NAME    ,
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```
REF_PROP_SPACE_AXIS ,
REF_PROP_SPACE_TYPE ,
REF_PROP_SPACE_LEGLEN ,
REF_PROP_SPACE_STIFF ,
REF_PROP_SPACE_RATIO ,

REF_PROP_DES_STL_BEAM = 1082000,
REF_PROP_DES_STL_BEAM_NAME ,
REF_PROP_DES_STL_BEAM_GRADE ,
REF_PROP_DES_STL_BEAM_L_OVERRIDE ,
REF_PROP_DES_STL_BEAM_LYY ,
REF_PROP_DES_STL_BEAM_LZZ ,
REF_PROP_DES_STL_BEAM_LLT ,
REF_PROP_DES_STL_BEAM_PLAS_ELAS_RATIO ,
REF_PROP_DES_STL_BEAM_AREA_RATIO ,
REF_PROP_DES_STL_BEAM_BETA_FACTOR ,

REF_PROP_DES_STL_REST = 1082200,
REF_PROP_DES_STL_REST_NAME ,
REF_PROP_DES_STL_REST_TYPE ,
REF_PROP_DES_STL_REST_REF ,
REF_PROP_DES_STL_REST_LD_HT ,
REF_PROP_DES_STL_REST_DESC ,

REF_PROP_DES_RC_BEAM = 1084000,
REF_PROP_DES_RC_BEAM_NAME ,
REF_PROP_DES_RC_BEAM_TYPE ,
REF_PROP_DES_RC_BEAM_CONC ,
REF_PROP_DES_RC_BEAM_REBAR_MAIN ,
REF_PROP_DES_RC_BEAM_REBAR_LINK ,
REF_PROP_DES_RC_BEAM_LINK_SIZE ,
REF_PROP_DES_RC_BEAM_AGGREGATE ,
REF_PROP_DES_RC_BEAM_COVER_TOP ,
```

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REF_PROP_DES_RC_BEAM_COVER_BOT      ,
REF_PROP_DES_RC_BEAM_COVER_LEFT     ,
REF_PROP_DES_RC_BEAM_COVER_RIGHT    ,
REF_PROP_DES_RC_BEAM_LAYOUT_LEFT_NAME ,
REF_PROP_DES_RC_BEAM_LAYOUT_MIDDLE_NAME ,
REF_PROP_DES_RC_BEAM_LAYOUT_RIGHT_NAME ,

REF_PROP_DES_RC2D_BS8110_A          = 1089000,
REF_PROP_DES_RC2D_BS8110_A_NAME     ,
REF_PROP_DES_RC2D_BS8110_A_THETA1   ,
REF_PROP_DES_RC2D_BS8110_A_THETA2   ,
REF_PROP_DES_RC2D_BS8110_A_ZT1      ,
REF_PROP_DES_RC2D_BS8110_A_ZB1      ,
REF_PROP_DES_RC2D_BS8110_A_ZT2      ,
REF_PROP_DES_RC2D_BS8110_A_ZB2      ,
REF_PROP_DES_RC2D_BS8110_A_THICK    ,
REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_T1 ,
REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_T2 ,
REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_B1 ,
REF_PROP_DES_RC2D_BS8110_A_MIN_AREA_B2 ,

REF_PROP_DES_RC2D_BS8110_B          = 1089050,
REF_PROP_DES_RC2D_BS8110_B_NAME     ,
REF_PROP_DES_RC2D_BS8110_B_FCU      ,
REF_PROP_DES_RC2D_BS8110_B_GAMMA_MC ,
REF_PROP_DES_RC2D_BS8110_B_FCD1     ,
REF_PROP_DES_RC2D_BS8110_B_FCD2     ,
REF_PROP_DES_RC2D_BS8110_B_FT       ,
REF_PROP_DES_RC2D_BS8110_B_EPS_CTRANS ,
REF_PROP_DES_RC2D_BS8110_B_EPS_CAX  ,
REF_PROP_DES_RC2D_BS8110_B_EPS_CU   ,
REF_PROP_DES_RC2D_BS8110_B_XOVERD_MIN ,
REF_PROP_DES_RC2D_BS8110_B_XOVERD_MAX ,
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REF_PROP_DES_RC2D_BS8110_B_BETA ,
REF_PROP_DES_RC2D_BS8110_B_MOD_GAMMA_MC ,
REF_PROP_DES_RC2D_BS8110_B_MOD_PARAMS ,

REF_PROP_DES_RC2D_BS8110_C = 1089100,
REF_PROP_DES_RC2D_BS8110_C_NAME ,
REF_PROP_DES_RC2D_BS8110_C_FY ,
REF_PROP_DES_RC2D_BS8110_C_GAMMA_MS ,
REF_PROP_DES_RC2D_BS8110_C_FYD ,
REF_PROP_DES_RC2D_BS8110_C_FYDC ,
REF_PROP_DES_RC2D_BS8110_C_ES ,
REF_PROP_DES_RC2D_BS8110_C_FLIM ,
REF_PROP_DES_RC2D_BS8110_C_EPS_PLAS ,
REF_PROP_DES_RC2D_BS8110_C_EPS_PLASC ,
REF_PROP_DES_RC2D_BS8110_C_MOD_GAMMA_MS ,
REF_PROP_DES_RC2D_BS8110_C_MOD_PARAMS ,

REF_PROP_DES_RC2D_BS5400_A = 1089150,
REF_PROP_DES_RC2D_BS5400_A_NAME ,
REF_PROP_DES_RC2D_BS5400_A_THETA1 ,
REF_PROP_DES_RC2D_BS5400_A_THETA2 ,
REF_PROP_DES_RC2D_BS5400_A_ZT1 ,
REF_PROP_DES_RC2D_BS5400_A_ZB1 ,
REF_PROP_DES_RC2D_BS5400_A_ZT2 ,
REF_PROP_DES_RC2D_BS5400_A_ZB2 ,
REF_PROP_DES_RC2D_BS5400_A_THICK ,
REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_T1 ,
REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_T2 ,
REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_B1 ,
REF_PROP_DES_RC2D_BS5400_A_MIN_AREA_B2 ,

REF_PROP_DES_RC2D_BS5400_B = 1089200,
REF_PROP_DES_RC2D_BS5400_B_NAME ,
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REF_PROP_DES_RC2D_BS5400_B_FCU      ,
REF_PROP_DES_RC2D_BS5400_B_GAMMA_MC ,
REF_PROP_DES_RC2D_BS5400_B_FCD1     ,
REF_PROP_DES_RC2D_BS5400_B_FCD2     ,
REF_PROP_DES_RC2D_BS5400_B_FT       ,
REF_PROP_DES_RC2D_BS5400_B_EPS_CTRANS ,
REF_PROP_DES_RC2D_BS5400_B_EPS_CAX   ,
REF_PROP_DES_RC2D_BS5400_B_EPS_CU    ,
REF_PROP_DES_RC2D_BS5400_B_XOVERD_MIN ,
REF_PROP_DES_RC2D_BS5400_B_XOVERD_MAX ,
REF_PROP_DES_RC2D_BS5400_B_BETA      ,
REF_PROP_DES_RC2D_BS5400_B_MOD_GAMMA_MC ,
REF_PROP_DES_RC2D_BS5400_B_MOD_PARAMS ,

REF_PROP_DES_RC2D_BS5400_C          = 1089250,
REF_PROP_DES_RC2D_BS5400_C_NAME     ,
REF_PROP_DES_RC2D_BS5400_C_FY       ,
REF_PROP_DES_RC2D_BS5400_C_GAMMA_MS ,
REF_PROP_DES_RC2D_BS5400_C_FYD      ,
REF_PROP_DES_RC2D_BS5400_C_FYDC     ,
REF_PROP_DES_RC2D_BS5400_C_ES       ,
REF_PROP_DES_RC2D_BS5400_C_FLIM     ,
REF_PROP_DES_RC2D_BS5400_C_EPS_PLAS  ,
REF_PROP_DES_RC2D_BS5400_C_EPS_PLASC ,
REF_PROP_DES_RC2D_BS5400_C_MOD_GAMMA_MS ,
REF_PROP_DES_RC2D_BS5400_C_MOD_PARAMS ,

REF_PROP_DES_RC2D_EC2_A              = 1089300,
REF_PROP_DES_RC2D_EC2_A_NAME         ,
REF_PROP_DES_RC2D_EC2_A_THETA1      ,
REF_PROP_DES_RC2D_EC2_A_THETA2     ,
REF_PROP_DES_RC2D_EC2_A_ZT1         ,
REF_PROP_DES_RC2D_EC2_A_ZB1         ,

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REF_PROP_DES_RC2D_EC2_A_ZT2      ,
REF_PROP_DES_RC2D_EC2_A_ZB2      ,
REF_PROP_DES_RC2D_EC2_A_THICK     ,
REF_PROP_DES_RC2D_EC2_A_MIN_AREA_T1 ,
REF_PROP_DES_RC2D_EC2_A_MIN_AREA_T2 ,
REF_PROP_DES_RC2D_EC2_A_MIN_AREA_B1 ,
REF_PROP_DES_RC2D_EC2_A_MIN_AREA_B2 ,

REF_PROP_DES_RC2D_EC2_B           = 1089350,
REF_PROP_DES_RC2D_EC2_B_NAME      ,
REF_PROP_DES_RC2D_EC2_B_FCU       ,
REF_PROP_DES_RC2D_EC2_B_GAMMA_MC  ,
REF_PROP_DES_RC2D_EC2_B_FCD1     ,
REF_PROP_DES_RC2D_EC2_B_FCD2     ,
REF_PROP_DES_RC2D_EC2_B_FT       ,
REF_PROP_DES_RC2D_EC2_B_EPS_CTRANS ,
REF_PROP_DES_RC2D_EC2_B_EPS_CAX   ,
REF_PROP_DES_RC2D_EC2_B_EPS_CU    ,
REF_PROP_DES_RC2D_EC2_B_XOVERD_MIN ,
REF_PROP_DES_RC2D_EC2_B_XOVERD_MAX ,
REF_PROP_DES_RC2D_EC2_B_BETA      ,
REF_PROP_DES_RC2D_EC2_B_MOD_GAMMA_MC ,
REF_PROP_DES_RC2D_EC2_B_MOD_PARAMS ,

REF_PROP_DES_RC2D_EC2_C           = 1089400,
REF_PROP_DES_RC2D_EC2_C_NAME      ,
REF_PROP_DES_RC2D_EC2_C_FY        ,
REF_PROP_DES_RC2D_EC2_C_GAMMA_MS  ,
REF_PROP_DES_RC2D_EC2_C_FYD       ,
REF_PROP_DES_RC2D_EC2_C_FYDC     ,
REF_PROP_DES_RC2D_EC2_C_ES        ,
REF_PROP_DES_RC2D_EC2_C_FLIM      ,
REF_PROP_DES_RC2D_EC2_C_EPS_PLAS  ,

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REF_PROP_DES_RC2D_EC2_C_EPS_PLASC      ,
REF_PROP_DES_RC2D_EC2_C_MOD_GAMMA_MS   ,
REF_PROP_DES_RC2D_EC2_C_MOD_PARAMS     ,

REF_PROP_DES_RC2D_ACI318_A             = 1089450,
REF_PROP_DES_RC2D_ACI318_A_NAME        ,
REF_PROP_DES_RC2D_ACI318_A_THETA1      ,
REF_PROP_DES_RC2D_ACI318_A_THETA2      ,
REF_PROP_DES_RC2D_ACI318_A_ZT1         ,
REF_PROP_DES_RC2D_ACI318_A_ZB1         ,
REF_PROP_DES_RC2D_ACI318_A_ZT2         ,
REF_PROP_DES_RC2D_ACI318_A_ZB2         ,
REF_PROP_DES_RC2D_ACI318_A_THICK        ,
REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_T1 ,
REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_T2 ,
REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_B1 ,
REF_PROP_DES_RC2D_ACI318_A_MIN_AREA_B2 ,
REF_PROP_DES_RC2D_ACI318_A_PHI_C       ,
REF_PROP_DES_RC2D_ACI318_A_PHI_T       ,

REF_PROP_DES_RC2D_ACI318_B             = 1089500,
REF_PROP_DES_RC2D_ACI318_B_NAME        ,
REF_PROP_DES_RC2D_ACI318_B_FCU         ,
REF_PROP_DES_RC2D_ACI318_B_FCD1        ,
REF_PROP_DES_RC2D_ACI318_B_FCD2        ,
REF_PROP_DES_RC2D_ACI318_B_FT          ,
REF_PROP_DES_RC2D_ACI318_B_EPS_CTRANS  ,
REF_PROP_DES_RC2D_ACI318_B_EPS_CAX     ,
REF_PROP_DES_RC2D_ACI318_B_EPS_CU      ,
REF_PROP_DES_RC2D_ACI318_B_XOVERD_MIN  ,
REF_PROP_DES_RC2D_ACI318_B_XOVERD_MAX  ,
REF_PROP_DES_RC2D_ACI318_B_BETA        ,
REF_PROP_DES_RC2D_ACI318_B_MOD_PARAMS  ,
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REF_PROP_DES_RC2D_ACI318_C = 1089550,
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    REF_PROP_DES_RC2D_ACI318_C_FY ,
    REF_PROP_DES_RC2D_ACI318_C_FYD ,
    REF_PROP_DES_RC2D_ACI318_C_FYDC ,
    REF_PROP_DES_RC2D_ACI318_C_ES ,
    REF_PROP_DES_RC2D_ACI318_C_FLIM ,
    REF_PROP_DES_RC2D_ACI318_C_EPS_PLAS ,
    REF_PROP_DES_RC2D_ACI318_C_EPS_PLASC ,
    REF_PROP_DES_RC2D_ACI318_C_MOD_PARAMS ,

REF_PROP_DES_RC2D_AS3600_A = 1089600,
    REF_PROP_DES_RC2D_AS3600_A_NAME ,
    REF_PROP_DES_RC2D_AS3600_A_THETA1 ,
    REF_PROP_DES_RC2D_AS3600_A_THETA2 ,
    REF_PROP_DES_RC2D_AS3600_A_ZT1 ,
    REF_PROP_DES_RC2D_AS3600_A_ZB1 ,
    REF_PROP_DES_RC2D_AS3600_A_ZT2 ,
    REF_PROP_DES_RC2D_AS3600_A_ZB2 ,
    REF_PROP_DES_RC2D_AS3600_A_THICK ,
    REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_T1 ,
    REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_T2 ,
    REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_B1 ,
    REF_PROP_DES_RC2D_AS3600_A_MIN_AREA_B2 ,
    REF_PROP_DES_RC2D_AS3600_A_PHI_C ,
    REF_PROP_DES_RC2D_AS3600_A_PHI_T ,

REF_PROP_DES_RC2D_AS3600_B = 1089650,
    REF_PROP_DES_RC2D_AS3600_B_NAME ,
    REF_PROP_DES_RC2D_AS3600_B_FCU ,
    REF_PROP_DES_RC2D_AS3600_B_FCD1 ,
    REF_PROP_DES_RC2D_AS3600_B_FCD2 ,
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REF_PROP_DES_RC2D_AS3600_B_FT	,
REF_PROP_DES_RC2D_AS3600_B_EPS_CTRANS	,
REF_PROP_DES_RC2D_AS3600_B_EPS_CAX	,
REF_PROP_DES_RC2D_AS3600_B_EPS_CU	,
REF_PROP_DES_RC2D_AS3600_B_XOVERD_MIN	,
REF_PROP_DES_RC2D_AS3600_B_XOVERD_MAX	,
REF_PROP_DES_RC2D_AS3600_B_BETA	,
REF_PROP_DES_RC2D_AS3600_B_MOD_PARAMS	,
REF_PROP_DES_RC2D_AS3600_C	= 1089700,
REF_PROP_DES_RC2D_AS3600_C_NAME	,
REF_PROP_DES_RC2D_AS3600_C_FY	,
REF_PROP_DES_RC2D_AS3600_C_FYD	,
REF_PROP_DES_RC2D_AS3600_C_FYDC	,
REF_PROP_DES_RC2D_AS3600_C_ES	,
REF_PROP_DES_RC2D_AS3600_C_FLIM	,
REF_PROP_DES_RC2D_AS3600_C_EPS_PLAS	,
REF_PROP_DES_RC2D_AS3600_C_EPS_PLASC	,
REF_PROP_DES_RC2D_AS3600_C_MOD_PARAMS	,
REF_PROP_DES_RC2D_IS456_A	= 1089750,
REF_PROP_DES_RC2D_IS456_A_NAME	,
REF_PROP_DES_RC2D_IS456_A_THETA1	,
REF_PROP_DES_RC2D_IS456_A_THETA2	,
REF_PROP_DES_RC2D_IS456_A_ZT1	,
REF_PROP_DES_RC2D_IS456_A_ZB1	,
REF_PROP_DES_RC2D_IS456_A_ZT2	,
REF_PROP_DES_RC2D_IS456_A_ZB2	,
REF_PROP_DES_RC2D_IS456_A_THICK	,
REF_PROP_DES_RC2D_IS456_A_MIN_AREA_T1	,
REF_PROP_DES_RC2D_IS456_A_MIN_AREA_T2	,
REF_PROP_DES_RC2D_IS456_A_MIN_AREA_B1	,
REF_PROP_DES_RC2D_IS456_A_MIN_AREA_B2	,

REF_PROP_DES_RC2D_IS456_B	= 1089800,
REF_PROP_DES_RC2D_IS456_B_NAME	,
REF_PROP_DES_RC2D_IS456_B_FCU	,
REF_PROP_DES_RC2D_IS456_B_GAMMA_MC	,
REF_PROP_DES_RC2D_IS456_B_FCD1	,
REF_PROP_DES_RC2D_IS456_B_FCD2	,
REF_PROP_DES_RC2D_IS456_B_FT	,
REF_PROP_DES_RC2D_IS456_B_EPS_CTRANS	,
REF_PROP_DES_RC2D_IS456_B_EPS_CAX	,
REF_PROP_DES_RC2D_IS456_B_EPS_CU	,
REF_PROP_DES_RC2D_IS456_B_XOVERD_MIN	,
REF_PROP_DES_RC2D_IS456_B_XOVERD_MAX	,
REF_PROP_DES_RC2D_IS456_B_BETA	,
REF_PROP_DES_RC2D_IS456_B_MOD_GAMMA_MC	,
REF_PROP_DES_RC2D_IS456_B_MOD_PARAMS	,
REF_PROP_DES_RC2D_IS456_C	= 1089850,
REF_PROP_DES_RC2D_IS456_C_NAME	,
REF_PROP_DES_RC2D_IS456_C_FY	,
REF_PROP_DES_RC2D_IS456_C_GAMMA_MS	,
REF_PROP_DES_RC2D_IS456_C_FYD	,
REF_PROP_DES_RC2D_IS456_C_FYDC	,
REF_PROP_DES_RC2D_IS456_C_ES	,
REF_PROP_DES_RC2D_IS456_C_FLIM	,
REF_PROP_DES_RC2D_IS456_C_EPS_PLAS	,
REF_PROP_DES_RC2D_IS456_C_EPS_PLASC	,
REF_PROP_DES_RC2D_IS456_C_MOD_GAMMA_MS	,
REF_PROP_DES_RC2D_IS456_C_MOD_PARAMS	,
REF_PROP_DES_RC_BEAM_BAR_LIM	= 1090000,
REF_GEN_RESTR	= 1101000,

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REF_GEN_RESTR_NAME      ,
REF_GEN_RESTR_STAGE     ,
REF_GEN_RESTR_LIST      ,
REF_GEN_RESTR_TYPE      ,

REF_JOINT                = 1102000,
REF_JOINT_NAME          ,
REF_JOINT_STAGE         ,
REF_JOINT_SLAVE         ,
REF_JOINT_MASTER        ,
REF_JOINT_TYPE          ,

REF_RIGID_CONSTR        = 1103000,
REF_RIGID_CONSTR_NAME   ,
REF_RIGID_CONSTR_STAGE  ,
REF_RIGID_CONSTR_LIST   ,
REF_RIGID_CONSTR_MASTER ,
REF_RIGID_CONSTR_TYPE   ,

REF_CONST_EQN           = 1104000,
REF_CONST_EQN_NAME      ,
REF_CONST_EQN_STAGE     ,
REF_CONST_EQN_SLAVE     ,
REF_CONST_EQN_DIR       ,
REF_CONST_EQN_EQUATION  ,

REF_TIED_INTER          = 1105000,
REF_TIED_INTER_NAME     ,
REF_TIED_INTER_STAGE    ,
REF_TIED_INTER_SLAVE    ,
REF_TIED_INTER_MASTER   ,
REF_TIED_INTER_TYPE     ,
REF_TIED_INTER_TOL      ,
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REF_LAST_MODEL

REF_FIRST_LOAD

REF_FIRST_GR_LOAD

REF_ALL_LOADS = 2000200,

REF_GRID_POINT_LOAD = 2001000,

REF_GRID_POINT_FRC ,

REF_GRID_POINT_MOM ,

REF_GRID_LINE_LOAD = 2001100,

REF_GRID_LINE_FRC ,

REF_GRID_LINE_MOM ,

REF_GRID_AREA_LOAD = 2001200,

REF_GRID_AREA_FRC ,

REF_GRID_AREA_FX ,

REF_GRID_AREA_FY ,

REF_GRID_AREA_FZ ,

REF_ND_LOAD = 2002000,

REF_ND_LOAD_FRC ,

REF_ND_LOAD_MOM ,

REF_ND_APPL_TRANS ,

REF_ND_APPL_ROT ,

REF_ND_SETTLE_TRANS ,

REF_ND_SETTLE_ROT ,

REF_EL1D_LOAD = 2003000,

REF_EL1D_POINT_FRC ,

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REF_EL1D_POINT_MOM      ,
REF_EL1D_PATCH_FRC      ,
REF_EL1D_PATCH_MOM      ,
REF_EL1D_PRESTR         ,
REF_EL1D_PRESTR_MOM     ,
REF_EL1D_STRAIN         ,
REF_EL1D_INIT_LEN       ,
REF_EL1D_DIST_TRANS     ,
REF_EL1D_DIST_ROT       ,
REF_EL1D_TEMP           ,
REF_EL1D_TEMP_GRAD      ,

REF_EL2D_LOAD           = 2004000,
REF_EL2D_FACE_PRESS     ,
REF_EL2D_EDGE_PRESS     ,
REF_EL2D_PRESTR         ,
REF_EL2D_PRESTR_MOM     ,
REF_EL2D_STRAIN         ,
REF_EL2D_TEMP           ,
REF_EL2D_TEMP_GRAD     ,

REF_LAST_GR_LOAD

REF_LOAD_GRID_PT       = 2011000,
REF_LOAD_GRID_PT_NAME  ,
REF_LOAD_GRID_PT_GRID_PL ,
REF_LOAD_GRID_PT_GRID_X ,
REF_LOAD_GRID_PT_GRID_Y ,
REF_LOAD_GRID_PT_CASE  ,
REF_LOAD_GRID_PT_AXIS  ,
REF_LOAD_GRID_PT_DIR   ,
REF_LOAD_GRID_PT_VAL   ,
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REF_LOAD_GRID_LN                = 2011100,
    REF_LOAD_GRID_LN_NAME        ,
    REF_LOAD_GRID_LN_GRID_PL     ,
    REF_LOAD_GRID_LN_POLY        ,
    REF_LOAD_GRID_LN_CASE        ,
    REF_LOAD_GRID_LN_AXIS        ,
    REF_LOAD_GRID_LN_PROJ        ,
    REF_LOAD_GRID_LN_DIR         ,
    REF_LOAD_GRID_LN_VAL1        ,
    REF_LOAD_GRID_LN_VAL2        ,

REF_LOAD_GRID_AR                = 2011200,
    REF_LOAD_GRID_AR_NAME        ,
    REF_LOAD_GRID_AR_GRID_PL     ,
    REF_LOAD_GRID_AR_POLY        ,
    REF_LOAD_GRID_AR_CASE        ,
    REF_LOAD_GRID_AR_AXIS        ,
    REF_LOAD_GRID_AR_PROJ        ,
    REF_LOAD_GRID_AR_DIR         ,
    REF_LOAD_GRID_AR_VAL         ,

REF_LOAD_NODE                   = 2012000,
    REF_LOAD_NODE_NAME           ,
    REF_LOAD_NODE_LIST           ,
    REF_LOAD_NODE_CASE           ,
    REF_LOAD_NODE_AXIS           ,
    REF_LOAD_NODE_DIR            ,
    REF_LOAD_NODE_VAL            ,

REF_APPL_DISP                   = 2013000,
    REF_APPL_DISP_NAME           ,
    REF_APPL_DISP_LIST           ,
    REF_APPL_DISP_CASE           ,
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REF_APPL_DISP_AXIS      ,
REF_APPL_DISP_DIR       ,
REF_APPL_DISP_VAL       ,

REF_SETTLE               = 2014000,
REF_SETTLE_NAME         ,
REF_SETTLE_LIST         ,
REF_SETTLE_CASE         ,
REF_SETTLE_DIR          ,
REF_SETTLE_VAL          ,

REF_LOAD_BEAM           = 2015000,
REF_LOAD_BEAM_NAME      ,
REF_LOAD_BEAM_LIST      ,
REF_LOAD_BEAM_CASE      ,
REF_LOAD_BEAM_TYPE      ,
REF_LOAD_BEAM_AXIS      ,
REF_LOAD_BEAM_PROJ      ,
REF_LOAD_BEAM_DIR       ,
REF_LOAD_BEAM_POS1      ,
REF_LOAD_BEAM_VAL1      ,
REF_LOAD_BEAM_POS2      ,
REF_LOAD_BEAM_VAL2      ,

REF_LOAD_PRESTR         = 2017000,
REF_LOAD_PRESTR_NAME    ,
REF_LOAD_PRESTR_LIST    ,
REF_LOAD_PRESTR_CASE    ,
REF_LOAD_PRESTR_TYPE    ,
REF_LOAD_PRESTR_FRC     ,
REF_LOAD_PRESTR_OFFY    ,
REF_LOAD_PRESTR_OFFZ    ,
REF_LOAD_PRESTR_INITSTRN ,
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REF_LOAD_PRESTR_LACKFIT      ,
REF_LOAD_MEMDIST             = 2018000,
REF_LOAD_MEMDIST_NAME       ,
REF_LOAD_MEMDIST_LIST       ,
REF_LOAD_MEMDIST_CASE       ,
REF_LOAD_MEMDIST_DIR        ,
REF_LOAD_MEMDIST_POS        ,
REF_LOAD_MEMDIST_VAL        ,
REF_BEAM_TEMP                = 2019000,
REF_BEAM_TEMP_NAME          ,
REF_BEAM_TEMP_LIST          ,
REF_BEAM_TEMP_CASE          ,
REF_BEAM_TEMP_TYPE          ,
REF_BEAM_TEMP_CONST         ,
REF_BEAM_TEMP_POS1          ,
REF_BEAM_TEMP_VAL1          ,
REF_BEAM_TEMP_POS2          ,
REF_BEAM_TEMP_VAL2          ,
REF_LOAD_2D_FACE             = 2020000,
REF_LOAD_2D_FACE_NAME       ,
REF_LOAD_2D_FACE_LIST       ,
REF_LOAD_2D_FACE_CASE       ,
REF_LOAD_2D_FACE_AXIS       ,
REF_LOAD_2D_FACE_TYPE       ,
REF_LOAD_2D_FACE_DIR        ,
REF_LOAD_2D_FACE_VAL1       ,
REF_LOAD_2D_FACE_VAL2       ,
REF_LOAD_2D_FACE_VAL3       ,
REF_LOAD_2D_FACE_VAL4       ,
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REF_LOAD_2D_EDGE = 2021000,
    REF_LOAD_2D_EDGE_NAME ,
    REF_LOAD_2D_EDGE_LIST ,
    REF_LOAD_2D_EDGE_CASE ,
    REF_LOAD_2D_EDGE_AXIS ,
    REF_LOAD_2D_EDGE_EDGE ,
    REF_LOAD_2D_EDGE_DIR ,
    REF_LOAD_2D_EDGE_VAL1 ,
    REF_LOAD_2D_EDGE_VAL2 ,

REF_LOAD_2D_INPLANE = 2022000,
    REF_LOAD_2D_INPLANE_NAME ,
    REF_LOAD_2D_INPLANE_LIST ,
    REF_LOAD_2D_INPLANE_CASE ,
    REF_LOAD_2D_INPLANE_TYPE ,
    REF_LOAD_2D_INPLANE_DIR ,
    REF_LOAD_2D_INPLANE_VAL ,
    REF_LOAD_2D_INPLANE_OFFSET ,
    REF_LOAD_2D_INPLANE_STRAIN ,

REF_LOAD_2D_TEMP = 2023000,
    REF_LOAD_2D_TEMP_NAME ,
    REF_LOAD_2D_TEMP_LIST ,
    REF_LOAD_2D_TEMP_CASE ,
    REF_LOAD_2D_TEMP_TYPE ,
    REF_LOAD_2D_TEMP_CONST ,
    REF_LOAD_2D_TEMP_VAL1_TOP ,
    REF_LOAD_2D_TEMP_VAL1_BOT ,
    REF_LOAD_2D_TEMP_VAL2_TOP ,
    REF_LOAD_2D_TEMP_VAL2_BOT ,
    REF_LOAD_2D_TEMP_VAL3_TOP ,
    REF_LOAD_2D_TEMP_VAL3_BOT ,
    REF_LOAD_2D_TEMP_VAL4_TOP ,
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REF_LOAD_2D_TEMP_VAL4_BOT      ,
REF_LOAD_GRAV                   = 2024000,
REF_LOAD_GRAV_NAME              ,
REF_LOAD_GRAV_LIST              ,
REF_LOAD_GRAV_CASE              ,
REF_LOAD_GRAV_X                 ,
REF_LOAD_GRAV_Y                 ,
REF_LOAD_GRAV_Z                 ,
REF_LAST_LOAD
REF_FIRST_RESP
REF_RESP_SPECTRA                = 2100000,
REF_RESP_BASIC                  = 2101000,
REF_RESP_BASIC_NAME             ,
REF_RESP_BASIC_AXIS            ,
REF_RESP_BASIC_DIR              ,
REF_RESP_BASIC_SPECTRUM        ,
REF_RESP_BASIC_MODE             ,
REF_RESP_BASIC_COMB_TYPE       ,
REF_RESP_BASIC_DAMPING          ,
REF_RESP_COMB                   = 2102000,
REF_RESP_COMB_NAME             ,
REF_RESP_COMB_CASE_X           ,
REF_RESP_COMB_FAC_X            ,
REF_RESP_COMB_CASE_Y           ,
REF_RESP_COMB_FAC_Y            ,
REF_RESP_COMB_CASE_Z           ,
REF_RESP_COMB_FAC_Z            ,
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REF_DAMPING_TABLE	= 2103000,
REF_LOAD_CURVE	= 2103100,
REF_DLF_CURVE	= 2103110,
REF_FREQ_WT_CURVE	= 2103120,
REF_LAST_RESP	
REF_FIRST_BRIDGE	
REF_FIRST_GR_BRIDGE	
REF_BRG_ALIGN_AND_PATH	= 3000200,
REF_BRG_INFL_POINT	= 3000300,
REF_LAST_GR_BRIDGE	
REF_ALIGNMENT	= 3001000,
REF_ALIGNMENT_NAME	,
REF_ALIGNMENT_GRID_PL	,
REF_ALIGNMENT_CHAINAGE	,
REF_ALIGNMENT_CURVATURE	,
REF_ALIGNMENT_RADIUS	,
REF_BRG_PATH	= 3002000,
REF_BRG_PATH_NAME	,
REF_BRG_PATH_TYPE	,
REF_BRG_PATH_GROUP	,
REF_BRG_PATH_ALIGNMENT	,
REF_BRG_PATH_LEFT	,

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REF_BRG_PATH_CENTRE      ,
REF_BRG_PATH_RIGHT      ,
REF_BRG_PATH_GAUGE      ,
REF_BRG_PATH_RAIL_FACTOR ,

REF_VEH_STD              = 3003000,
REF_VEH_STD_NAME        ,
REF_VEH_STD_WIDTH       ,
REF_VEH_STD_AXLE_POS    ,
REF_VEH_STD_WHEEL_OFFSET ,
REF_VEH_STD_WHEEL_LOAD_LEFT ,
REF_VEH_STD_WHEEL_LOAD_RIGHT ,

REF_VEH_USER             = 3004000,
REF_VEH_USER_NAME       ,
REF_VEH_USER_WIDTH      ,
REF_VEH_USER_AXLE_POS   ,
REF_VEH_USER_WHEEL_OFFSET ,
REF_VEH_USER_WHEEL_LOAD_LEFT ,
REF_VEH_USER_WHEEL_LOAD_RIGHT ,

REF_BRG_VUDL_STD         = 3010000,
REF_BRG_VUDL_STD_NAME   ,
REF_BRG_VUDL_STD_NUM_SEG ,
REF_BRG_VUDL_STD_SEG1_FAC ,
REF_BRG_VUDL_STD_SEG1_IND ,
REF_BRG_VUDL_STD_TRANS1 ,
REF_BRG_VUDL_STD_SEG2_FAC ,
REF_BRG_VUDL_STD_SEG2_IND ,
REF_BRG_VUDL_STD_TRANS2 ,
REF_BRG_VUDL_STD_SEG3_FAC ,
REF_BRG_VUDL_STD_SEG3_IND ,
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REF_BRG_VUDL_USER = 3011000,
    REF_BRG_VUDL_USER_NAME ,
    REF_BRG_VUDL_USER_NUM_SEG ,
    REF_BRG_VUDL_USER_SEG1_FAC ,
    REF_BRG_VUDL_USER_SEG1_IND ,
    REF_BRG_VUDL_USER_TRANS1 ,
    REF_BRG_VUDL_USER_SEG2_FAC ,
    REF_BRG_VUDL_USER_SEG2_IND ,
    REF_BRG_VUDL_USER_TRANS2 ,
    REF_BRG_VUDL_USER_SEG3_FAC ,
    REF_BRG_VUDL_USER_SEG3_IND ,

REF_BRG_INFL_EFF_NODE = 3012000,
    REF_BRG_INFL_EFF_NODE_NAME ,
    REF_BRG_INFL_EFF_NODE_EFF ,
    REF_BRG_INFL_EFF_NODE_NODE ,
    REF_BRG_INFL_EFF_NODE_FAC ,
    REF_BRG_INFL_EFF_NODE_TYPE ,
    REF_BRG_INFL_EFF_NODE_AXIS ,
    REF_BRG_INFL_EFF_NODE_DIR ,

REF_BRG_INFL_EFF_BEAM = 3013000,
    REF_BRG_INFL_EFF_BEAM_NAME ,
    REF_BRG_INFL_EFF_BEAM_EFF ,
    REF_BRG_INFL_EFF_BEAM_BEAM ,
    REF_BRG_INFL_EFF_BEAM_POS ,
    REF_BRG_INFL_EFF_BEAM_FAC ,
    REF_BRG_INFL_EFF_BEAM_TYPE ,
    REF_BRG_INFL_EFF_BEAM_AXIS ,
    REF_BRG_INFL_EFF_BEAM_DIR ,

REF_BRG_PATH_LOAD = 3014000,
    REF_BRG_PATH_LOAD_PATH ,
```

```
REF_BRG_PATH_LOAD_TYPE ,
REF_BRG_PATH_LOAD_VUDL ,
REF_BRG_PATH_LOAD_VUDL_FAC ,
REF_BRG_PATH_LOAD_KEL ,
REF_BRG_PATH_LOAD_VEH ,
REF_BRG_PATH_LOAD_VEH_FAC ,
REF_BRG_PATH_LOAD_VEH_EXCL ,
REF_BRG_PATH_LOAD_VEH2 ,
REF_BRG_PATH_LOAD_VEH_FAC2 ,
REF_BRG_PATH_LOAD_VEH_EXCL2 ,

REF_BRG_LOAD_STATIC = 3015000,
REF_BRG_LOAD_STATIC_NAME ,
REF_BRG_LOAD_STATIC_GROUP ,
REF_BRG_LOAD_STATIC_PATH ,
REF_BRG_LOAD_STATIC_TYPE ,
REF_BRG_LOAD_STATIC_CHAIN_START ,
REF_BRG_LOAD_STATIC_CHAIN_END ,
REF_BRG_LOAD_STATIC_VEH ,
REF_BRG_LOAD_STATIC_FACTOR ,
REF_BRG_LOAD_STATIC_EFFECT ,
REF_BRG_LOAD_STATIC_GRP_EFFECT ,

REF_BRG_LOAD_MOVING = 3016000,
REF_BRG_LOAD_MOVING_NAME ,
REF_BRG_LOAD_MOVING_PATH ,
REF_BRG_LOAD_MOVING_TYPE ,
REF_BRG_LOAD_MOVING_CHAIN_START ,
REF_BRG_LOAD_MOVING_CHAIN_END ,
REF_BRG_LOAD_MOVING_CHAIN_INT ,
REF_BRG_LOAD_MOVING_VEH ,
REF_BRG_LOAD_MOVING_FACTOR ,
```

```
REF_BRG_AUTO_PATH = 3017000,
    REF_BRG_AUTO_PATH_NAME ,
    REF_BRG_AUTO_PATH_TYPE ,
    REF_BRG_AUTO_PATH_GROUP ,
    REF_BRG_AUTO_PATH_ALIGNMENT ,
    REF_BRG_AUTO_PATH_LEFT ,
    REF_BRG_AUTO_PATH_CENTRE ,
    REF_BRG_AUTO_PATH_RIGHT ,
    REF_BRG_AUTO_PATH_GAUGE ,
    REF_BRG_AUTO_PATH_RAIL_FACTOR ,
    REF_BRG_AUTO_PATH_ANALYSE ,

REF_BRG_AUTO_PATH_LOAD = 3018000,
    REF_BRG_AUTO_PATH_LOAD_PATH ,
    REF_BRG_AUTO_PATH_LOAD_TYPE ,
    REF_BRG_AUTO_PATH_LOAD_VUDL ,
    REF_BRG_AUTO_PATH_LOAD_VUDL_FAC ,
    REF_BRG_AUTO_PATH_LOAD_KEL ,
    REF_BRG_AUTO_PATH_LOAD_VEH ,
    REF_BRG_AUTO_PATH_LOAD_VEH_FAC ,
    REF_BRG_AUTO_PATH_LOAD_VEH_EXCL ,
    REF_BRG_AUTO_PATH_LOAD_VEH2 ,
    REF_BRG_AUTO_PATH_LOAD_VEH_FAC2 ,
    REF_BRG_AUTO_PATH_LOAD_VEH_EXCL2 ,

REF_BRG_LOAD_BASIC = 3019000,
    REF_BRG_LOAD_BASIC_NAME ,
    REF_BRG_LOAD_BASIC_GROUP ,
    REF_BRG_LOAD_BASIC_PATH ,
    REF_BRG_LOAD_BASIC_TYPE ,
    REF_BRG_LOAD_BASIC_CHAIN_START ,
    REF_BRG_LOAD_BASIC_CHAIN_END ,
    REF_BRG_LOAD_BASIC_VEH ,
```

```
REF_BRG_LOAD_BASIC_FACTOR      ,
REF_BRG_LOAD_BASIC_EFFECT      ,
REF_BRG_LOAD_BASIC_GRP_EFFECT  ,

REF_BRG_AUTO_OPTI_SUM          = 3020000,
REF_BRG_AUTO_OPTI_SUM_NAME     ,
REF_BRG_AUTO_OPTI_SUM_HBPATH   ,
REF_BRG_AUTO_OPTI_SUM_LANE1PATH ,
REF_BRG_AUTO_OPTI_SUM_LANE1FAC ,
REF_BRG_AUTO_OPTI_SUM_LANE2PATH ,
REF_BRG_AUTO_OPTI_SUM_LANE2FAC ,
REF_BRG_AUTO_OPTI_SUM_LANE3PATH ,
REF_BRG_AUTO_OPTI_SUM_LANE3FAC ,
REF_BRG_AUTO_OPTI_SUM_LANE4PATH ,
REF_BRG_AUTO_OPTI_SUM_LANE4FAC ,
REF_BRG_AUTO_OPTI_SUM_TOTEFFECT ,
REF_BRG_AUTO_OPTI_SUM_FACEFFECT ,
REF_BRG_AUTO_OPTI_SUM_CRITICAL ,

REF_BRG_AUTO_OPTI_SUM_EC1      = 3021000,
REF_BRG_AUTO_OPTI_SUM_EC1_NAME ,
REF_BRG_AUTO_OPTI_SUM_EC1_HBPATH ,
REF_BRG_AUTO_OPTI_SUM_EC1_LANE1PATH ,
REF_BRG_AUTO_OPTI_SUM_EC1_LANE2PATH ,
REF_BRG_AUTO_OPTI_SUM_EC1_LANE3PATH ,
REF_BRG_AUTO_OPTI_SUM_EC1_LANE4PATH ,
REF_BRG_AUTO_OPTI_SUM_EC1_TOTEFFECT ,
REF_BRG_AUTO_OPTI_SUM_EC1_FACEFFECT ,
REF_BRG_AUTO_OPTI_SUM_EC1_CRITICAL ,

REF_BRG_AUTO_OPTI_SUM_US       = 3022000,
REF_BRG_AUTO_OPTI_SUM_US_NAME  ,
REF_BRG_AUTO_OPTI_SUM_US_SIDE  ,
```

```

//number of loaded lanes  REF_BRG_AUTO_OPTI_SUM_US_NUM_LDL      ,
                           REF_BRG_AUTO_OPTI_SUM_US_LANE_A      ,
                           REF_BRG_AUTO_OPTI_SUM_US_LANE_B      ,
                           REF_BRG_AUTO_OPTI_SUM_US_LANE_C      ,
                           REF_BRG_AUTO_OPTI_SUM_US_TOTEFFECT    ,
                           REF_BRG_AUTO_OPTI_SUM_US_CRITICAL    ,

REF_LAST_BRIDGE

REF_FIRST_STAGE

                           REF_STAGE_DEFN                       = 4001000,
                           REF_STAGE_DEFN_NAME                  ,
                           REF_STAGE_DEFN_LIST                  ,
                           REF_STAGE_DEFN_PHI                    ,

                           REF_STAGE_PROP                       = 4002000,
                           REF_STAGE_PROP_STAGE                  ,
                           REF_STAGE_PROP_TYPE                   ,
                           REF_STAGE_PROP_ELEM_PROP              ,
                           REF_STAGE_PROP_REC                    ,

REF_LAST_STAGE

REF_FIRST_GENERAL

                           REF_LIST                             = 5001000,
                           REF_LIST_NAME                         ,
                           REF_LIST_TYPE                         ,
                           REF_LIST_DEFN                         ,

                           REF_ASSEMBLY                         = 5002000,
                           REF_ASSEMBLY_NAME                    ,

```

```
REF_ASSEMBLY_ELEM ,
REF_ASSEMBLY_TYPE ,
REF_ASSEMBLY_TOP1 ,
REF_ASSEMBLY_TOP2 ,
REF_ASSEMBLY_TOP3 ,
REF_ASSEMBLY_ITOP ,
REF_ASSEMBLY_FIT ,
REF_ASSEMBLY_AXIS ,
REF_ASSEMBLY_AUTO ,
REF_ASSEMBLY_END1 ,
REF_ASSEMBLY_END2 ,
REF_ASSEMBLY_OFF ,
REF_ASSEMBLY_Y ,
REF_ASSEMBLY_Z ,
REF_ASSEMBLY_DEFN ,
REF_ASSEMBLY_POINTS ,
REF_ASSEMBLY_SPACING ,
REF_ASSEMBLY_STOREY ,
REF_ASSEMBLY_EXPLICIT ,
```

```
REF_LAST_GENERAL
```

```
REF_FIRST_RESULT
```

```
////////////////////////////////////
```

```
// global results
```

```
////////////////////////////////////
```

```
// not available via COM Output
```

```
REF_GLOBAL_DET = 10000800,
REF_MASS_DET =
REF_GLOBAL_DET,
```

```

REF_MASS_DET_MASS ,
REF_MASS_DET_INERTIA ,
REF_MASS_DET_CENTRE ,
REF_GLOBAL_ENERGY ,
REF_MAT_ENERGY ,
REF_MAT_ENERGY_STD ,
REF_ERROR_NORM ,
REF_RESID_LIMIT_FRC ,
REF_RESID_LIMIT_MOM ,
REF_RESID_LIMIT_DISP ,
REF_INFL_POS ,
// superseded REF_MASS_DET_UNRES_MASS ,

REF_MASS_STOREY_MASS ,
REF_MASS_STOREY_INERTIA ,
REF_MASS_STOREY_CENTRE ,

// active mass REF_MASS_DET_MASS3 ,
// active inertia REF_MASS_DET_INERTIA3 ,
REF_MASS_STOREY_MASS3 ,
REF_MASS_STOREY_INERTIA3 ,

// not available via COM Output
REF_DYN_DET = 10001000,
REF_DYN_DET_MODE ,
REF_DYN_DET_FREQUENCY ,
REF_DYN_DET_MODAL_MASS ,
REF_DYN_DET_MODAL_STIFF ,
REF_DYN_DET_MODAL_GEO_STIFF ,
REF_DYN_DET_EFF_MASS ,
REF_DYN_DET_EFF_INERTIA ,
REF_DYN_DET_PART_FAC ,
REF_DYN_DET_ROT_PART_FAC ,

```

```
REF_DYN_DET_MODAL_DAMP ,

// not available via COM Output
REF_DYN_SUM = 10001100,

// not available via COM Output
REF_MODEL_STAB = 10001200,

// not available via COM Output
REF_BUCK_DET = 10002000,
REF_BUCK_DET_LOAD_FAC ,

// not available via COM Output
REF_RESP_DET = 10003000,
REF_RESP_DET_CASES ,
REF_RESP_DET_MODE ,
REF_RESP_DET_FREQ ,
REF_RESP_DET_MASS ,
REF_RESP_DET_SPECACC ,
REF_RESP_DET_BASESHEAR ,
REF_RESP_DET_MODEMULT ,
REF_RESP_DET_PERIOD ,
REF_RESP_DET_UBCMETHOD ,
REF_RESP_DET_TOTALBASESHEAR ,
REF_RESP_DET_DAMP ,
REF_RESP_DET_ETA ,
REF_RESP_DET_REACT ,
REF_RESP_DET_SCALE ,
REF_RESP_DET_FORCE ,
REF_RESP_DET_MOMENT ,
REF_RESP_DET_ORIGIN ,
REF_RESP_DET_BASESHEAR_EQN ,
```

// not available via COM Output

REF_STL_DES_SYNOPSIS = 10004000,

REF_NL_LOAD_FACT_DISP = 10005000,

REF_NL_LOAD_FACT_DISP_X ,

REF_NL_LOAD_FACT_DISP_Y ,

REF_NL_LOAD_FACT_DISP_Z ,

REF_NL_LOAD_FACT_DISP_TRANS ,

REF_NL_LOAD_FACT_DISP_XX ,

REF_NL_LOAD_FACT_DISP_YY ,

REF_NL_LOAD_FACT_DISP_ZZ ,

REF_NL_LOAD_FACT_DISP_ROT ,

REF_NL_AX_FRC_DISP = 10006000,

REF_NL_AX_FRC_DISP_X ,

REF_NL_AX_FRC_DISP_Y ,

REF_NL_AX_FRC_DISP_Z ,

REF_NL_AX_FRC_DISP_TRANS ,

REF_NL_AX_FRC_DISP_XX ,

REF_NL_AX_FRC_DISP_YY ,

REF_NL_AX_FRC_DISP_ZZ ,

REF_NL_AX_FRC_DISP_ROT ,

// not available via COM Output

REF_INFL_NODE_RES_DET = 10007000,

// not available via COM Output

REF_INFL_NODE_LOBE_DET = 10008000,

// not available via COM Output

REF_INFL_BEAM_RES_DET = 10009000,

// not available via COM Output

```
REF_INFL_BEAM_LOBE_DET = 10010000,  
  
// not available via COM Output  
REF_TOTALS = 11001000,  
REF_TOTALS_FX ,  
REF_TOTALS_FY ,  
REF_TOTALS_FZ ,  
REF_TOTALS_FRC ,  
REF_TOTALS_MXX ,  
REF_TOTALS_MYY ,  
REF_TOTALS_MZZ ,  
REF_TOTALS_MOM ,  
  
REF_DEFM_ELEV = 11002000,  
REF_DEFM_ELEV_X ,  
REF_DEFM_ELEV_Y ,  
REF_DEFM_ELEV_Z ,  
  
// not available via COM Output  
REF_BRG_INFLUENCE = 11003000,  
  
////////////////////////////////////  
// nodal results  
////////////////////////////////////  
  
REF_DISP = 12001000,  
REF_DISP_DX ,  
REF_DISP_DY ,  
REF_DISP_DZ ,  
REF_DISP_TRANS ,  
REF_DISP_RXX ,  
REF_DISP_RYY ,  
REF_DISP_RZZ ,
```

REF_DISP_ROT	,
REF_DISP_DXY	,
REF_VEL	= 12002000,
REF_VEL_VX	,
REF_VEL_VY	,
REF_VEL_VZ	,
REF_VEL_TRANS	,
REF_VEL_VXX	,
REF_VEL_VYY	,
REF_VEL_VZZ	,
REF_VEL_ROT	,
REF_ACC	= 12003000,
REF_ACC_AX	,
REF_ACC_AY	,
REF_ACC_AZ	,
REF_ACC_TRANS	,
REF_ACC_AXX	,
REF_ACC_AYY	,
REF_ACC_AZZ	,
REF_ACC_ROT	,
REF_REAC	= 12004000,
REF_REAC_FX	,
REF_REAC_FY	,
REF_REAC_FZ	,
REF_REAC_FRC	,
REF_REAC_MXX	,
REF_REAC_MYY	,
REF_REAC_MZZ	,
REF_REAC_MOM	,

```
REF_FORCE_CONSTR                = 12005000,
    REF_FORCE_CONSTR_FX          ,
    REF_FORCE_CONSTR_FY          ,
    REF_FORCE_CONSTR_FZ          ,
    REF_FORCE_CONSTR_FRC         ,
    REF_FORCE_CONSTR_MXX         ,
    REF_FORCE_CONSTR_MYY         ,
    REF_FORCE_CONSTR_MZZ         ,
    REF_FORCE_CONSTR_MOM         ,

REF_FORCE_NODAL                  = 12006000,
    REF_FORCE_NODAL_FX           ,
    REF_FORCE_NODAL_FY           ,
    REF_FORCE_NODAL_FZ           ,
    REF_FORCE_NODAL_FRC         ,
    REF_FORCE_NODAL_MXX         ,
    REF_FORCE_NODAL_MYY         ,
    REF_FORCE_NODAL_MZZ         ,
    REF_FORCE_NODAL_MOM         ,

REF_MASS_NODAL                   = 12007000,
    REF_MASS_NODAL_MASS          ,
    REF_MASS_NODAL_IXX           ,
    REF_MASS_NODAL_IYY           ,
    REF_MASS_NODAL_IZZ           ,
    REF_MASS_NODAL_IXY           ,
    REF_MASS_NODAL_IYZ           ,
    REF_MASS_NODAL_IZX           ,

// not used directly in output but written to file
    REF_MASS_NODAL_INERTIA       = 12007100,

REF_SOIL_NODAL                   = 12008000,
```

```

REF_SOIL_NODAL_AREA_X      ,
REF_SOIL_NODAL_PRESSURE_X ,
REF_SOIL_NODAL_AREA_Y     ,
REF_SOIL_NODAL_PRESSURE_Y ,
REF_SOIL_NODAL_AREA_Z     ,
REF_SOIL_NODAL_PRESSURE_Z ,
REF_SOIL_NODAL_AREA_S     ,
REF_SOIL_NODAL_PRESSURE_S ,

REF_FOOTFALL_RESON        = 12009000,
REF_FOOTFALL_RESON_RESP_FACTOR ,
REF_FOOTFALL_RESON_PEAK_VELOCITY ,
REF_FOOTFALL_RESON_RMS_VELOCITY ,
REF_FOOTFALL_RESON_PEAK_ACC ,
REF_FOOTFALL_RESON_RMS_ACC ,
REF_FOOTFALL_RESON_CRIT_NODE ,
REF_FOOTFALL_RESON_CRIT_FREQ ,

REF_FOOTFALL_TRANS        = 12009100,
REF_FOOTFALL_TRANS_RESP_FACTOR ,
REF_FOOTFALL_TRANS_PEAK_VELOCITY ,
REF_FOOTFALL_TRANS_RMS_VELOCITY ,
REF_FOOTFALL_TRANS_PEAK_ACC ,
REF_FOOTFALL_TRANS_RMS_ACC ,
REF_FOOTFALL_TRANS_CRIT_NODE ,
REF_FOOTFALL_TRANS_CRIT_FREQ ,

REF_FOOTFALL_SUM          = 12009200,
REF_FOOTFALL_SUM_RESON_RESP_FACTOR ,
REF_FOOTFALL_SUM_TRANS_RESP_FACTOR ,
REF_FOOTFALL_SUM_MAX_RESP_FACTOR ,

```

////////////////////////////////////

// nodal results on elements - table placeholders only; components as per
 respective nodal tables

////////////////////////////////////

```

REF_VEL_ON_ELEM = 12502000,

REF_ACC_ON_ELEM = 12503000,

REF_SOIL_NODAL_ON_ELEM = 12508000,

REF_FOOTFALL_RESON_ON_ELEM = 12509000,

REF_FOOTFALL_TRANS_ON_ELEM = 12509100,

REF_FOOTFALL_SUM_ON_ELEM = 12509200,
    
```

////////////////////////////////////

// 0D element results

////////////////////////////////////

REF_FIRST_EL0D_RESULT

```

REF_DISP_EL0D = 13001000,
    REF_DISP_EL0D_DX ,
    REF_DISP_EL0D_DY ,
    REF_DISP_EL0D_DZ ,
    REF_DISP_EL0D_TRANS ,
    REF_DISP_EL0D_RXX ,
    REF_DISP_EL0D_RYY ,
    REF_DISP_EL0D_RZZ ,
    REF_DISP_EL0D_ROT ,

REF_FORCE_EL0D = 13002000,
    
```

```
REF_FORCE_EL0D_FX      ,
REF_FORCE_EL0D_FY      ,
REF_FORCE_EL0D_FZ      ,
REF_FORCE_EL0D_FRC     ,
REF_FORCE_EL0D_MXX     ,
REF_FORCE_EL0D_MYY     ,
REF_FORCE_EL0D_MZZ     ,
REF_FORCE_EL0D_MOM     ,
```

```
REF_LAST_EL0D_RESULT
```

```
////////////////////////////////////
// 1D element results
////////////////////////////////////
```

```
REF_FIRST_EL1D_RESULT
```

```
REF_DISP_EL1D          = 14001000,
REF_DISP_EL1D_DX       ,
REF_DISP_EL1D_DY       ,
REF_DISP_EL1D_DZ       ,
REF_DISP_EL1D_TRANS    ,
REF_DISP_EL1D_RXX      ,
REF_DISP_EL1D_RYY      ,
REF_DISP_EL1D_RZZ      ,
REF_DISP_EL1D_ROT      ,

REF_END_ROT_EL1D       = 14001500,
REF_END_ROT_EL1D_MAJOR ,

REF_FORCE_EL1D         = 14002000,
REF_FORCE_EL1D_FX      ,
REF_FORCE_EL1D_FY      ,
```

REF_FORCE_EL1D_FZ	,
REF_FORCE_EL1D_FRC	,
REF_FORCE_EL1D_MXX	,
REF_FORCE_EL1D_MYY	,
REF_FORCE_EL1D_MZZ	,
REF_FORCE_EL1D_MOM	,
REF_FORCE_EL1D_FYZ	,
REF_FORCE_EL1D_MYZ	,
REF_STRESS_EL1D	= 14003000,
REF_STRESS_EL1D_A	,
REF_STRESS_EL1D_SY	,
REF_STRESS_EL1D_SZ	,
REF_STRESS_EL1D_BY_POSZ	,
REF_STRESS_EL1D_BY_NEGZ	,
REF_STRESS_EL1D_BZ_POSY	,
REF_STRESS_EL1D_BZ_NEGY	,
REF_STRESS_EL1D_C1	,
REF_STRESS_EL1D_C2	,
REF_STRESS_EL1D_CY	,
REF_STRESS_EL1D_CZ	,
REF_STRESS_EL1D_DRV	= 14003200,
REF_STRESS_EL1D_DRV_SY	,
REF_STRESS_EL1D_DRV_SZ	,
REF_STRESS_EL1D_DRV_ST	,
REF_STRESS_EL1D_DRV_V_MISES	,
REF_STRAIN_EL1D	= 14003500,
REF_STRAIN_EL1D_A	,
REF_SED_EL1D	= 14004000,
REF_SED_EL1D_WEB	,

```
REF_SED_EL1D_FLG ,
REF_SED_EL1D_TOT ,

REF_SED_AVG_EL1D = 14005000,
REF_SED_AVG_EL1D_WEB ,
REF_SED_AVG_EL1D_FLG ,
REF_SED_AVG_EL1D_TOT ,

// per member

REF_STL_UTIL = 14006000,
REF_STL_UTIL_OVER_ALL ,
REF_STL_UTIL_LCL_COMB ,
REF_STL_UTIL_BCK_COMB ,
REF_STL_UTIL_LCL_A ,
REF_STL_UTIL_LCL_SU ,
REF_STL_UTIL_LCL_SV ,
REF_STL_UTIL_LCL_MXX ,
REF_STL_UTIL_LCL_MUU ,
REF_STL_UTIL_LCL_MVV ,
REF_STL_UTIL_BCK_UU ,
REF_STL_UTIL_BCK_VV ,
REF_STL_UTIL_BCK_LT ,
REF_STL_UTIL_BCK_TOR ,
REF_STL_UTIL_BCK_FT ,
REF_STL_UTIL_GOVERN ,

// per member

REF_STL_DES_MEMB_EFF_LEN_FAC = 14006100,
REF_STL_DES_MEMB_EFF_LEN_FAC_MAJ ,
REF_STL_DES_MEMB_EFF_LEN_FAC_MIN ,
REF_STL_DES_MEMB_EFF_LEN_FAC_LT ,
```

```
// per member
```

```
REF_STL_DES_SUMMARY = 14006200,
// per member
REF_STL_DES_CALC_VRB = 14006400,
// per member
REF_STL_DES_CALC_BRF = 14006500,
// per member
REF_STL_DES_MEMB_EFF_LEN = 14006600,

REF_TORCE_LINE = 14007000,
REF_TORCE_LINE_POS ,
REF_TORCE_LINE_NEG ,

REF_SHEAR_LINE = 14008000,
REF_SHEAR_LINE_POS ,
REF_SHEAR_LINE_NEG ,

REF_LAST_EL1D_RESULT

//////////
// 2D element results
//////////

REF_FIRST_EL2D_RESULT

REF_DISP_EL2D = 15001000,
REF_DISP_EL2D_DX ,
REF_DISP_EL2D_DY ,
REF_DISP_EL2D_DZ ,
REF_DISP_EL2D_TRANS ,
REF_DISP_EL2D_RXX ,
REF_DISP_EL2D_RYY ,
REF_DISP_EL2D_RZZ ,
REF_DISP_EL2D_ROT ,
```

REF_FORCE_EL2D_DRV	= 15002000,
REF_FORCE_EL2D_DRV_PRIN_M	,
REF_FORCE_EL2D_DRV_PRIN_N	,
REF_FORCE_EL2D_DRV_MMAX	,
REF_FORCE_EL2D_DRV_MMIN	,
REF_FORCE_EL2D_DRV_MANG	,
REF_FORCE_EL2D_DRV_NMAX	,
REF_FORCE_EL2D_DRV_NMIN	,
REF_FORCE_EL2D_DRV_NANG	,
REF_FORCE_EL2D_DRV_QMAX	,
REF_MOMENT_EL2D_PRJ	= 15003000,
REF_MOMENT_EL2D_PRJ_M	,
REF_MOMENT_EL2D_PRJ_MX	,
REF_MOMENT_EL2D_PRJ_MY	,
REF_MOMENT_EL2D_PRJ_MXY	,
REF_MOMENT_EL2D_PRJ_MXMY	,
REF_MOMENT_EL2D_PRJ_MYMYX	,
REF_FORCE_EL2D_PRJ	= 15004000,
REF_FORCE_EL2D_PRJ_N	,
REF_FORCE_EL2D_PRJ_Q	,
REF_FORCE_EL2D_PRJ_NX	,
REF_FORCE_EL2D_PRJ_NY	,
REF_FORCE_EL2D_PRJ_NXY	,
REF_FORCE_EL2D_PRJ_QX	,
REF_FORCE_EL2D_PRJ_QY	,
REF_STRESS_EL2D_DRV	= 15005000,
REF_STRESS_EL2D_DRV_PRIN	,
REF_STRESS_EL2D_DRV_MAX	,
REF_STRESS_EL2D_DRV_MIN	,

```

REF_STRESS_EL2D_DRV_ANG ,
REF_STRESS_EL2D_DRV_MAX_SH ,
REF_STRESS_EL2D_DRV_V_MISES ,
REF_STRESS_EL2D_DRV_AVERAGE ,

REF_STRESS_EL2D_AX = 15006000,
REF_STRESS_EL2D_AX_XX ,
REF_STRESS_EL2D_AX_YY ,
REF_STRESS_EL2D_AX_ZZ ,
REF_STRESS_EL2D_AX_XY ,
REF_STRESS_EL2D_AX_YZ ,
REF_STRESS_EL2D_AX_ZX ,

REF_STRESS_EL2D_PRJ = 15007000,
REF_STRESS_EL2D_PRJ_XX ,
REF_STRESS_EL2D_PRJ_YY ,
REF_STRESS_EL2D_PRJ_ZZ ,
REF_STRESS_EL2D_PRJ_XY ,
REF_STRESS_EL2D_PRJ_YZ ,
REF_STRESS_EL2D_PRJ_ZX ,

REF_EL2D_STRESS_ERROR = 15008000,
REF_EL2D_STRESS_ERROR_ERR ,

REF_SOIL_EL2D = 15009000,
REF_SOIL_EL2D_PRESSURE ,

//WallRes REF_FORCE_ELWALL = 15009500,
REF_FORCE_ELWALL_FX ,
REF_FORCE_ELWALL_FY ,
REF_FORCE_ELWALL_FZ ,
REF_FORCE_ELWALL_FRC ,
REF_FORCE_ELWALL_MXX ,

```

```
REF_FORCE_ELWALL_MYY ,
REF_FORCE_ELWALL_MZZ ,
REF_FORCE_ELWALL_MOM ,

REF_RC_SLAB_REINF = 15010000,
REF_RC_SLAB_REINF_NOTE ,
REF_RC_SLAB_REINF_TOP_A ,
REF_RC_SLAB_REINF_TOP_B ,
REF_RC_SLAB_REINF_BOT_A ,
REF_RC_SLAB_REINF_BOT_B ,
REF_RC_SLAB_REINF_TOP ,
REF_RC_SLAB_REINF_BOT ,

REF_LAST_EL2D_RESULT

////////////////////////////////////
// element gen results
////////////////////////////////////

REF_FIRST_ELGEN_RESULT

REF_STRAIN_ENERGY = 16001000,
REF_STRAIN_ENERGY_ENERGY ,

REF_VIRTUAL_ENERGY = 16002000,
REF_VIRTUAL_ENERGY_ENERGY ,

REF_RES_ACCURACY = 16008000,
REF_RES_ACCURACY_SIGFIG ,

REF_LAST_ELGEN_RESULT

////////////////////////////////////
```

```
// assembly results
```

```
////////////////////////////////////
```

```
REF_FIRST_ASSEM_RESULT
```

```
REF_DISP_ASSEM = 18001000,  
REF_DISP_ASSEM_DX ,  
REF_DISP_ASSEM_DY ,  
REF_DISP_ASSEM_DZ ,  
REF_DISP_ASSEM_TRANS ,  
REF_DISP_ASSEM_RXX ,  
REF_DISP_ASSEM_RYY ,  
REF_DISP_ASSEM_RZZ ,  
REF_DISP_ASSEM_ROT ,
```

```
REF_DRIFT_ASSEM = 18001500,  
REF_DRIFT_ASSEM_DX ,  
REF_DRIFT_ASSEM_DY ,  
REF_DRIFT_ASSEM_DZ ,  
REF_DRIFT_ASSEM_TRANS ,  
REF_DRIFT_ASSEM_RXX ,  
REF_DRIFT_ASSEM_RYY ,  
REF_DRIFT_ASSEM_RZZ ,  
REF_DRIFT_ASSEM_ROT ,  
REF_DRIFT_ASSEM_DXY ,
```

```
REF_DRIFTINDEX_ASSEM = 18001600,  
REF_DRIFTINDEX_ASSEM_DX ,  
REF_DRIFTINDEX_ASSEM_DY ,  
REF_DRIFTINDEX_ASSEM_DZ ,  
REF_DRIFTINDEX_ASSEM_TRANS ,  
REF_DRIFTINDEX_ASSEM_RXX ,  
REF_DRIFTINDEX_ASSEM_RYY ,
```

```
REF_DRIFTINDEX_ASSEM_RZZ      ,
REF_DRIFTINDEX_ASSEM_ROT      ,
REF_DRIFTINDEX_ASSEM_DXY      ,

REF_FORCE_ASSEM                = 18002000,
REF_FORCE_ASSEM_FX              ,
REF_FORCE_ASSEM_FY              ,
REF_FORCE_ASSEM_FZ              ,
REF_FORCE_ASSEM_FRC             ,
REF_FORCE_ASSEM_MXX            ,
REF_FORCE_ASSEM_MYY            ,
REF_FORCE_ASSEM_MZZ            ,
REF_FORCE_ASSEM_MOM            ,

REF_LAST_ASSEM_RESULT
REF_LAST_RESULT

////////////////////////////////////
// user module data
////////////////////////////////////

REF_FIRST_USER_MOD              = 1000000000,

// e.g. REF_USER_MOD_NODE + n refers to Node User Module n
// (gap between user module enums must be MAX_USER_MOD min.)

// per node
REF_USER_MOD_NODE                = 1020000000,

// per element
REF_USER_MOD_NODE_ON_ELEM        = 1025000000,

// per element
```

```
REF_USER_MOD_ELEM = 1030000000,  
  
// per member  
REF_USER_MOD_MEMBER = 1035000000,  
  
REF_LAST_USER_MOD = 1100000000,  
};
```