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AMENDMENT 1
1992-09-01

**Information processing systems — Computer
graphics — Programmer's Hierarchical
Interactive Graphics System (PHIGS) —**

Part 3 :
Clear-text encoding of archive file

AMENDMENT 1

*Systèmes de traitement de l'information — Infographie — Interface de
programmation du système graphique hiérarchisé (PHIGS) —*

Partie 3 : Codage mode texte en clair du fichier d'archive

AMENDEMENT 1



Reference number
ISO/IEC 9592-3 : 1989/Amd.1 : 1992 (E)

Foreword

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Amendment 1 to International Standard ISO/IEC 9592-3 : 1989 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

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Introduction

This amendment specifies the additions and changes to ISO/IEC 9592-3 to support the structure elements specified in ISO/IEC 9592-4. A clear text encoding is specified for each of the structure element types specified in ISO/IEC 9592-4.

Unless otherwise specified, all references in this amendment refer to ISO/IEC 9592-3.

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**Information processing systems—Computer graphics—
 Programmer's Hierarchical Interactive Graphics System (PHIGS)—
 Part 3: Clear-text encoding of archive file
 Amendment 1**

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4.2.4.5 Derived types

Add the following:

COLRCURVE ::= <LEFT PAREN><OPTSEP>
 <I:ORDER> <SEP>
 <RLIST:KNOTS> <SEP>
 <RATIONAL | NONRATIONAL> <SEP>
 <I:COLOUR TYPE> <SEP>
 <COLRVLIST:CONTROL_POINTS>
 <OPTSEP> <RIGHT PAREN>

COLRSURF ::= <LEFT PAREN><OPTSEP>
 <I:U_ORDER> <SEP>
 <I:V_ORDER> <SEP>
 <RLIST:U_KNOTS> <SEP>
 <RLIST:V_KNOTS> <SEP>
 <RATIONAL | NONRATIONAL> <SEP>
 <I:COLOUR_TYPE> <SEP>
 <COLRVLISTS:CONTROL_POINTS>
 <OPTSEP> <RIGHT PAREN>

NOTE: Each COLRVLIST contains control points along the u dimension.

COLRV ::= < <I:COLOUR_INDEX>
 | <COORDLIST:COLOUR_COORDINATES>
 >

COLRVLIST ::= <LEFT PAREN> <OPTSEP>
 < <COLRV> <<SEP> <COLRV>>* >0
 <OPTSEP> <RIGHT PAREN>

COLRVLISTS ::= <LEFT PAREN> <OPTSEP>
 < <COLRVLIST> <<SEP> <COLRVLIST>>* >0
 <OPTSEP> <RIGHT PAREN>

COLRVROWS ::= COLRVLISTS

COORDLIST ::= <LEFT PAREN> <OPTSEP>
 <COORD> << SEP> <COORD>> *
 <OPTSEP> <RIGHT PAREN>

CURVEAPPROXDATAREC ::= <LEFT PAREN> <OPTSEP>
 <<I:COUNT>
 | <R:APPROXIMATION_VALUE>
 | <S:TYPE_DEPENDENT_DATA>> 0
 <OPTSEP> <RIGHT PAREN>>

DATAMAPPINGDATAREC ::= <LEFT PAREN> <OPTSEP>
 <
 <DATAMAPPINGDATAREC1>
 | <DATAMAPPINGDATAREC2>
 | <DATAMAPPINGDATAREC3>
 | <DATAMAPPINGDATAREC4>
 | <DATAMAPPINGDATAREC5>
 | <S:METHOD_DEPENDENT_DATA>
 > 0
 <OPTSEP> <RIGHT PAREN>

DATAMAPPINGDATAREC1 ::= <SOURCESELECTORLIST:SELECTOR>

DATAMAPPINGDATAREC2 ::= <SOURCESELECTORLIST:SELECTOR> <SEP>
 <I:INDEX> <SEP>
 <R:LOWER_LIMIT> <SEP>
 <R:UPPER_LIMIT> <SEP>
 <I:COLOUR_TYPE> <SEP>
 <CORLVLIST:COLOUR_LIST>

DATAMAPPINGDATAREC3 ::= <SOURCESELECTORLIST:SELECTOR> <SEP>
 <I:INDEX> <SEP>
 <RLIST:RANGE_BOUNDARIES> <SEP>
 <I:COLOUR_TYPE> <SEP>
 <CORLVLIST:COLOUR_LIST>

DATAMAPPINGDATAREC4 ::= <SOURCESELECTORLIST:SELECTOR> <SEP>
 <I:INDEX_1> <SEP>
 <I:INDEX_2> <SEP>
 <R:Ra_LOWER_LIMIT> <SEP>
 <R:Ra_UPPER_LIMIT> <SEP>
 <R:Rb_LOWER_LIMIT> <SEP>
 <R:Rb_UPPER_LIMIT> <SEP>
 <I:COLOUR_TYPE> <SEP>
 <CORLVLISTS:COLOUR_LISTS>

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DATAMAPPINGDATAREC5	::= <SOURCESELECTORLIST:SELECTOR> <SEP> <I:INDEX_1> <SEP> <I:INDEX_2> <SEP> <RLISTS:Ra_RANGE_BOUNDARIES> <SEP> <RLISTS:Rb_RANGE_BOUNDARIES> <SEP> <I:COLOUR_TYPE> <SEP> <CORLVLISTS:COLOUR_LISTS>
DATASURF	::= <LEFT PAREN> <OPTSEP> <I:U_ORDER> <SEP> <I:V_ORDER> <SEP> <RLIST:U_KNOTS> <SEP> <RLIST:V_KNOTS> <SEP> <RATIONAL NONRATIONAL> <SEP> <RLISTS:CONTROL_POINTS> <OPTSEP> <RIGHT PAREN>
NOTE: Each RLIST is a single control point. Each RLISTS contains control points along the <i>u</i> dimension.	
DATASURFLIST	::= <LEFT PAREN> <OPTSEP> <DATASURF> <<SEP> <DATASURF>>* <OPTSEP> <RIGHT PAREN>
EDGEDATAFLAG	::= < NONE EDGE_VISIBILITY_FLAGS >
EDGEFLAG	::= < OFF ON >
EDGEFLAG2	::= <LEFT PAREN> <OPTSEP> <EDGEFLAG> <SEP> <EDGEFLAG> <OPTSEP> <RIGHT PAREN>
EDGEFLAG2ROW	::= <LEFT PAREN> <OPTSEP> <<EDGEFLAG2> <<SEP> <EDGEFLAG2>>* >0 <OPTSEP> <RIGHT PAREN>
EDGEFLAG3	::= <LEFT PAREN> <OPTSEP> <EDGEFLAG> <SEP> <EDGEFLAG> <SEP> <EDGEFLAG> <OPTSEP> <RIGHT PAREN>
EDGEFLAG3LIST	::= <LEFT PAREN> <OPTSEP> <<EDGEFLAG3> <<SEP> <EDGEFLAG3>>* >0 <OPTSEP> <RIGHT PAREN>
EDGEFLAGLIST	::= <LEFT PAREN> <OPTSEP> <<EDGEFLAG> <<SEP> <EDGEFLAG>>* >0 <OPTSEP> <RIGHT PAREN>
EDGEFLAGLISTS	::= <LEFT PAREN> <OPTSEP> <<EDGEFLAGLIST> <<SEP> <EDGEFLAGLIST>>* >0 <OPTSEP> <RIGHT PAREN>

EDGEFLAGLISTSLIST ::= <LEFT PAREN> <OPTSEP>
 <<EDGEFLAGLISTS> <<SEP> <EDGEFLAGLISTS>>* >o
 <OPTSEP> <RIGHT PAREN>

EDGEFLAGROW ::= <EDGEFLAGLIST>

FACETDATA ::= <LEFT PAREN> <OPTSEP>
 <COLRV>o
 <<SEP> <V3:UNIT_NORMAL>>o
 <<SEP> <RLIST:DATA_MAPPING_DATA>>o
 <OPTSEP> <RIGHT PAREN>

FACETDATAFLAG ::= <
 NONE
 | FACET_COLR
 | FACET_NORMAL
 | FACET_DATA
 | FACET_COLR_NORMAL
 | FACET_COLR_DATA
 | FACET_NORMAL_DATA
 | FACET_COLR_NORMAL_DATA
 >

FACETDATALIST ::= <LEFT PAREN> <OPTSEP>
 <<FACETDATA> <<SEP> <FACETDATA>>* >o
 <OPTSEP> <RIGHT PAREN>

FACETDATALISTS ::= <LEFT PAREN> <OPTSEP>
 <<FACETDATALIST> <<SEP> <FACETDATALIST>>* >o
 <OPTSEP> <RIGHT PAREN>

FACETDAROW ::= <FACETDATALIST>

GCOLR ::= <I:COLOUR_TYPE> <SEP> <COLRV>

INT3 ::= <LEFT PAREN> <OPTSEP>
 <I> <SEP> <I> <SEP> <I>
 <OPTSEP> <RIGHT PAREN>

INT3LIST ::= <LEFT PAREN> <OPTSEP>
 <<INT3> <<SEP> <INT3>>* >o
 <OPTSEP> <RIGHT PAREN>>

INT3LISTS ::= <LEFT PAREN> <OPTSEP>
 <<INT3LIST> <<SEP> <INT3LIST>>* >o
 <OPTSEP> <RIGHT PAREN>>

INTLIST ::= <LEFT PAREN> <OPTSEP>
 <<I> <<SEP> <I>>* >o
 <OPTSEP> <RIGHT PAREN>>

INTLISTS	::= <LEFT PAREN> <OPTSEP> <<INTLIST> <<SEP> <INTLIST>>* >0 <OPTSEP> <RIGHT PAREN>>
INTLISTSLIST	::= <LEFT PAREN> <OPTSEP> <<INTLISTS> <<SEP> <INTLISTS>>* >0 <OPTSEP> <RIGHT PAREN>>
P4	::= < <POINT4> <LEFT PAREN> <OPTSEP> <POINT4> <OPTSEP> <RIGHT PAREN> >
POINT4	::= <COORD:wX> <SEP> <COORD:wY> <SEP> <COORD:wZ> <SEP> <COORD:w>
POINTLIST4	::= <<P4:POINT> <<SEP> <P4:POINT>>* >0
PARAMSURFCHARACDATAREC	::= <LEFT PAREN> <OPTSEP> < <PARAMSURFCHARACDATAREC3> <PARAMSURFCHARACDATAREC4> <S:TYPE_DEPENDENT_DATA> >0 <OPTSEP> <RIGHT PAREN>
PARAMSURFCHARACDATAREC3	::= <UNIFORM NONUNIFORM> <SEP> <I.U_COUNT> <SEP> <I.V_COUNT> <OPTSEP> <RIGHT PAREN>
PARAMSURFCHARACDATAREC4	::= <P3:ORIGIN_POINT> <SEP> <V3:DIRECTION_VECTOR> <SEP> <RLIST:PARAMETERS>
REFLPROPSDATAREC	::= <LEFT PAREN> <OPTSEP> < <REFLDATAREC1> <S:METHOD_DEPENDENT_DATA> >0 <OPTSEP> <RIGHT PAREN>
REFLPROPSDATAREC1	::= <R:AMBIENT_REFLECTION_COEFFICIENT> <SEP> <R:DIFFUSE_REFLECTION_COEFFICIENT> <SEP> <R:SPECULAR_REFLECTION_COEFFICIENT> <SEP> <GCOLR:SPECULAR_COLOUR> <SEP> <R:SPECULAR_EXPONENT>

RLIST ::= <LEFT PAREN> <OPTSEP>
 <<R> <<SEP> <R>>* >0
 <OPTSEP> <RIGHT PAREN>

RLISTS ::= <LEFT PAREN> <OPTSEP>
 <<RLIST> <<SEP> <RLIST>>* >0
 <OPTSEP> <RIGHT PAREN>

RLISTSLLIST ::= <LEFT PAREN> <OPTSEP>
 <<RLISTS> <<SEP> <RLISTS>>* >0
 <OPTSEP> <RIGHT PAREN>

SOURCESELECTOR ::= <
 COLOUR_ASPECT
 | VERTEX_COLOUR
 | VERTEX_DATA
 | FACET_COLOUR
 | FACET_DATA
 >

SOURCESELECTORLIST ::= <LEFT PAREN> <OPTSEP>
 <<SOURCESELECTOR> <<SEP> <SOURCESELECTOR>>* >0
 <OPTSEP> <RIGHT PAREN>

SURFAPPROXDATAREC ::= <LEFT PAREN> <OPTSEP>
 <<I:U_COUNT> <SEP> <I:V_COUNT>
 | <R:APPROXIMATION_VALUE>
 | <R:U_APPROXIMATION_VALUE> <SEP>
 <R:V_APPROXIMATION_VALUE>
 | <S:TYPE_DEPENDENT_DATA>>0
 <OPTSEP> <RIGHT PAREN>>

TRIMCURVE ::= <LEFT PAREN> <OPTSEP>
 <I:APPROXIMATION_TYPE> <SEP>
 <CURVEAPPROXDATAREC:DATA_RECORD>
 <OFF | ON:EDGE_FLAG> <SEP>
 <I:ORDER> <SEP>
 <RLIST:KNOTS> <SEP>
 <R:TMIN> <SEP> <R:TMAX> <SEP>
 <
 <RATIONAL <SEP>
 <POINTLIST3:CONTROL_POINTS>>
 | <NONRATIONAL <SEP>
 <POINTLIST2:CONTROL_POINTS>>
 >
 <OPTSEP> <RIGHT PAREN>

TRIMLOOP ::= <LEFT PAREN> <OPTSEP>
 <TRIMCURVE> <<SEP> <TRIMCURVE>>*
 <OPTSEP> <RIGHT PAREN>

TRIMLOOPLIST	::= <LEFT PAREN> <OPTSEP> <TRIMLOOP> <<SEP> <TRIMLOOP>>* <OPTSEP> <RIGHT PAREN>
VERTEXDATA2	::= <LEFT PAREN> <OPTSEP> <P2:POINT> <<SEP> <COLRV>>0 <<SEP> <V3:UNIT_NORMAL>>0 <<SEP> <RLIST:DATA_MAPPING_DATA>>0 <OPTSEP> <RIGHT PAREN>
VERTEXDATA2LIST	::= <LEFT PAREN> <OPTSEP> < <VERTEXDATA2> <<SEP> <VERTEXDATA2>>* >0 <OPTSEP> <RIGHT PAREN>
VERTEXDATA2LISTS	::= <LEFT PAREN> <OPTSEP> < <VERTEXDATA2LIST> <<SEP> <VERTEXDATA2LIST>>* >0 <OPTSEP> <RIGHT PAREN>
VERTEXDATA3	::= <LEFT PAREN> <OPTSEP> <P3:POINT> <<SEP> <COLRV>>0 <<SEP> <V3:UNIT_NORMAL>>0 <<SEP> <RLIST:DATA_MAPPING_DATA>>0 <OPTSEP> <RIGHT PAREN>
VERTEXDATA3LIST	::= <LEFT PAREN> <OPTSEP> < <VERTEXDATA3> <<SEP> <VERTEXDATA3>>* >0 <OPTSEP> <RIGHT PAREN>
VERTEXDATA3LISTS	::= <LEFT PAREN> <OPTSEP> < <VERTEXDATA3LIST> <<SEP> <VERTEXDATA3LIST>>* >0 <OPTSEP> <RIGHT PAREN>
VERTEXDATAFLAG	::= < COORD COORD_COLR COORD_NORMAL COORD_DATA COORD_COLR_NORMAL COORD_COLR_DATA COORD_NORMAL_DATA COORD_COLR_NORMAL_DATA >
VERTEXDATAPL3	::= <LEFT PAREN> <OPTSEP> <P3:POINT> <<SEP> <COLRV>>0 <OPTSEP> <RIGHT PAREN>

VERTEXDATAPL3LIST ::= <LEFT PAREN> <OPTSEP>
< <VERTEXDATAPL3> <<SEP> <VERTEXDATAPL3>>* >o
<OPTSEP> <RIGHT PAREN>

VERTEXDATAPL3LISTS ::= <LEFT PAREN> <OPTSEP>
< <VERTEXDATAPL3LIST> <<SEP> <VERTEXDATAPL3LIST>>* >o
<OPTSEP> <RIGHT PAREN>

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4.2.5.1 Terms deleted

Add the following:

OF, WITH

4.2.5.3 Words used unabbreviated

Add the following:

BACK, CURVE, DATA, FRONT, LIGHT, MAPPING, MODE

4.2.5.4 Abbreviations

Add the following:

APPROXIMATION	→	APPROX
CHARACTERISTICS	→	CHARAC
CRITERIA	→	CRIT
CULLING	→	CULL
DEPTH CUE	→	DEPTHCUE
DISTINGUISHING	→	DIST
METHOD	→	METH
NON_UNIFORM_B_SPLINE	→	NUNIBSP
PARAMETRIC	→	PARAM
PROPERTIES	→	PROPS
QUADRILATERAL	→	QUAD
REFLECTANCE	→	REFL
RENDERING	→	REND
SHADING	→	SHAD
SOURCE	→	SRC
SURFACE	→	SURF
TRIANGLE	→	TRI
TRIMMING CURVE	→	TRIMCURV

4.2.5.7 The derived archive file element names

Add the following:

POLYLINE SET 3 WITH COLOUR	→	ARF_LINESET3COLR
FILL AREA SET 3 WITH DATA	→	ARF_FILLAREASET3DATA
FILL AREA SET WITH DATA	→	ARF_FILLAREASETDATA
CELL ARRAY 3 PLUS	→	ARF_CELLARRAY3PLUS
SET OF FILL AREA SETS 3 WITH DATA	→	ARF_SETFILLAREASETS3DATA
SET OF FILL AREA SETS WITH DATA	→	ARF_SETFILLAREASETSDATA
TRIANGLE SET 3 WITH DATA	→	ARF_TRISSET3DATA
TRIANGLE SET WITH DATA	→	ARF_TRISSETDATA
TRIANGLE STRIP 3 WITH DATA	→	ARF_TRISTRIP3DATA
TRIANGLE STRIP WITH DATA	→	ARF_TRISTRIPDATA
QUADRILATERAL MESH 3 WITH DATA	→	ARF_QUADMESH3DATA
QUADRILATERAL MESH WITH DATA	→	ARF_QUADMESHDATA
NON-UNIFORM B-SPLINE CURVE	→	ARF_NUNIBSPCURVE
NON-UNIFORM B-SPLINE CURVE WITH COLOUR	→	ARF_NUNIBSPCURVECOLR
NON-UNIFORM B-SPLINE SURFACE	→	ARF_NUNIBSPSURF
NON-UNIFORM B-SPLINE SURFACE WITH DATA	→	ARF_NUNIBSPSURFDATA
SET DATA MAPPING INDEX	→	ARF_DATAMAPPINGINDEX
SET REFLECTANCE INDEX	→	ARF_REFLINDEX
SET BACK INTERIOR INDEX	→	ARF_BACKINTINDEX
SET BACK DATA MAPPING INDEX	→	ARF_BACKDATAMAPPINGINDEX
SET BACK REFLECTANCE INDEX	→	ARF_BACKREFLINDEX
SET PARAMETRIC SURFACE INDEX	→	ARF_PARAMSURFINDEX
SET POLYLINE COLOUR	→	ARF_LINECOLR
SET POLYLINE SHADING METHOD	→	ARF_LINESHADMETH
SET POLYMARKER COLOUR	→	ARF_MARKERCOLR
SET TEXT COLOUR	→	ARF_TEXTCOLR
SET FACET DISTINGUISHING MODE	→	ARF_FACETDISTMODE
SET FACET CULLING MODE	→	ARF_FACETCULLMODE
SET INTERIOR COLOUR	→	ARF_INTCOLR
SET INTERIOR SHADING METHOD	→	ARF_INTSHADMETH
SET DATA MAPPING METHOD	→	ARF_DATAMAPPINGMETH
SET REFLECTANCE PROPERTIES	→	ARF_REFLPROPS
SET REFLECTANCE MODEL	→	ARF_REFLMODEL

SET BACK INTERIOR STYLE	→	ARF_BACKINTSTYLE
SET BACK INTERIOR STYLE INDEX	→	ARF_BACKINTSTYLEINDEX
SET BACK INTERIOR COLOUR	→	ARF_BACKINTCOLR
SET BACK INTERIOR SHADING METHOD	→	ARF_BACKINTSHADMETH
SET BACK DATA MAPPING METHOD	→	ARF_BACKDATAMAPPINGMETH
SET BACK REFLECTANCE PROPERTIES	→	ARF_BACKREFLPROPS
SET BACK REFLECTANCE MODEL	→	ARF_BACKREFLMODEL
SET LIGHT SOURCE STATE	→	ARF_LIGHTSRCSTATE
SET EDGE COLOUR	→	ARF_EDGECOLR
SET CURVE APPROXIMATION CRITERIA	→	ARF_CURVEAPPROXCRIT
SET SURFACE APPROXIMATION CRITERIA	→	ARF_SURFAPPROXCRIT
SET PARAMETRIC SURFACE CHARACTERISTICS	→	ARF_PARAMSURFCHARAC
SET RENDERING COLOUR MODEL	→	ARF_RENDCOLRMODEL
SET DEPTH CUE INDEX	→	ARF_DEPTHCUEINDEX
SET COLOUR MAPPING INDEX	→	ARF_COLRMAPPINGINDEX

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4.3.3 The structure element production

Add the following:

|
 <POLYLINE SET 3 WITH COLOUR> |
 <FILL AREA SET 3 WITH DATA> |
 <FILL AREA SET WITH DATA> |
 <CELL ARRAY 3 PLUS> |
 <SET OF FILL AREA SETS 3 WITH DATA> |
 <SET OF FILL AREA SETS WITH DATA> |
 <TRIANGLE SET 3 WITH DATA> |
 <TRIANGLE SET WITH DATA> |
 <TRIANGLE STRIP 3 WITH DATA> |
 <TRIANGLE STRIP WITH DATA> |
 <QUADRILATERAL MESH 3 WITH DATA> |
 <QUADRILATERAL MESH WITH DATA> |
 <NON-UNIFORM B-SPLINE CURVE> |
 <NON-UNIFORM B-SPLINE CURVE WITH COLOUR> |
 <NON-UNIFORM B-SPLINE SURFACE> |
 <NON-UNIFORM B-SPLINE SURFACE WITH DATA> |

<SET DATA MAPPING INDEX> |
<SET REFLECTANCE INDEX> |
<SET BACK INTERIOR INDEX> |
<SET BACK DATA MAPPING INDEX> |
<SET BACK REFLECTANCE INDEX> |
<SET PARAMETRIC SURFACE INDEX> |
<SET POLYLINE COLOUR> |
<SET POLYLINE SHADING METHOD> |
<SET POLYMARKER COLOUR> |
<SET TEXT COLOUR> |
<SET FACET DISTINGUISHING MODE> |
<SET FACET CULLING MODE> |
<SET INTERIOR COLOUR> |
<SET INTERIOR SHADING METHOD> |
<SET DATA MAPPING METHOD> |
<SET REFLECTANCE PROPERTIES> |
<SET REFLECTANCE MODEL> |
<SET BACK INTERIOR STYLE> |
<SET BACK INTERIOR STYLE INDEX> |
<SET BACK INTERIOR COLOUR> |
<SET BACK INTERIOR SHADING METHOD> |
<SET BACK DATA MAPPING METHOD> |
<SET BACK REFLECTANCE PROPERTIES> |
<SET BACK REFLECTANCE MODEL> |
<SET LIGHT SOURCE STATE> |
<SET EDGE COLOUR> |
<SET CURVE APPROXIMATION CRITERIA> |
<SET SURFACE APPROXIMATION CRITERIA> |
<SET PARAMETRIC SURFACE CHARACTERISTICS> |
<SET RENDERING COLOUR MODEL> |
<SET DEPTH CUE INDEX> |
<SET COLOUR MAPPING INDEX>

4.3.4 Encoding output primitive elements

Add the following:

```

POLYLINE SET 3 WITH COLOUR ::= ARF_LINESET3DATA
    <SOFTSEP>
    <VERTEXDATAFLAG> <SEP>
    <I:COLOUR_TYPE> <SEP>
    <VERTEXDATAPL3LISTS>
    <TERM>

FILL AREA SET 3 WITH DATA ::= ARF_FILLAREASET3DATA
    <SOFTSEP>
    <FACETDATAFLAG> <SEP>
    <EDGEDATAFLAG> <SEP>
    <VERTEXDATAFLAG>
    <<SEP> <I:COLOUR_TYPE>>0
    <<SEP> <FACETDATA>>0
    <<SEP> <EDGEFLAGLISTS>>0
    <SEP> <VERTEXDATA3LISTS>
    <TERM>

FILL AREA SET WITH DATA ::= ARF_FILLAREASETDATA
    <SOFTSEP>
    <FACETDATAFLAG> <SEP>
    <EDGEDATAFLAG> <SEP>
    <VERTEXDATAFLAG>
    <<SEP> <I:COLOUR_TYPE>>0
    <<SEP> <FACETDATA>>0
    <<SEP> <EDGEFLAGLISTS>>0
    <SEP> <VERTEXDATA2LISTS>
    <TERM>

CELL ARRAY 3 PLUS ::= ARF_CELLARRAY3PLUS
    <SOFTSEP>
    <P3:P_POINT> <SEP>
    <P3:Q_POINT> <SEP>
    <P3:R_POINT> <SEP>
    <I:COLOUR_TYPE> <SEP>
    <I:X_DIM> <SEP>
    <I:Y_DIM> <SEP>
    <COLRVROWS>
    <TERM>
    
```

SET OF FILL AREA
SETS 3 WITH DATA

```
 ::= ARF_SETFILLAREASETS3DATA
    <SOFTSEP>
    <FACETDATAFLAG> <SEP>
    <EDGEDATAFLAG> <SEP>
    <VERTEXDATAFLAG>
    <<SEP> <I:COLOUR_TYPE>>o
    <<SEP> <FACETDATALIST>>o
    <<SEP> <EDGEFLAGLISTSLIST>o
    <SEP> <VERTEXDATA3LIST> <SEP>
    <INTLISTSLIST:VERTEX_INDICES>
    <TERM>
```

SET OF FILL AREA
SETS WITH DATA

```
 ::= ARF_SETFILLAREASETSDATA
    <SOFTSEP>
    <FACETDATAFLAG> <SEP>
    <EDGEDATAFLAG> <SEP>
    <VERTEXDATAFLAG>
    <<SEP> <I:COLOUR_TYPE>>o
    <<SEP> <FACETDATALIST>>o
    <<SEP> <EDGEFLAGLISTSLIST>>o
    <SEP> <VERTEXDATA2LIST> <SEP>
    <INTLISTSLIST:VERTEX_INDICES>
    <TERM>
```

TRIANGLE SET 3 WITH DATA

```
 ::= ARF_TRISSET3DATA
    <SOFTSEP>
    <FACETDATAFLAG> <SEP>
    <EDGEDATAFLAG> <SEP>
    <VERTEXDATAFLAG>
    <<SEP> <I:COLOUR_TYPE>>o
    <<SEP> <FACETDATALIST>>o
    <<SEP> <EDGEFLAG3LIST>o
    <SEP> <VERTEXDATA3LIST> <SEP>
    <INT3LISTS:VERTEX_INDICES>
    <TERM>
```

TRIANGLE SET WITH DATA ::= ARF_TRISSETDATA
 <SOFTSEP>
 <FACETDATAFLAG> <SEP>
 <EDGEDATAFLAG> <SEP>
 <VERTEXDATAFLAG>
 <<SEP> <I:COLOUR_TYPE>>0
 <<SEP> <FACETDATALIST>>0
 <<SEP> <EDGEFLAG3LIST>0
 <SEP> <VERTEXDATA2LIST> <SEP>
 <INT3LISTS:VERTEX_INDICES>
 <TERM>

TRIANGLE STRIP 3 WITH DATA ::= ARF_TRISTRIP3DATA
 <SOFTSEP>
 <FACETDATAFLAG> <SEP>
 <EDGEDATAFLAG> <SEP>
 <VERTEXDATAFLAG>
 <<SEP> <I:COLOUR_TYPE>>0
 <<SEP> <FACETDATALIST>>0
 <<SEP> <EDGEFLAGLIST>>0
 <SEP> <VERTEXDATA3LIST>
 <TERM>

TRIANGLE STRIP WITH DATA ::= ARF_TRISTRIPDATA
 <SOFTSEP>
 <FACETDATAFLAG> <SEP>
 <EDGEDATAFLAG> <SEP>
 <VERTEXDATAFLAG>
 <<SEP> <I:COLOUR_TYPE>>0
 <<SEP><FACETDATALIST>>0
 <<SEP><EDGEFLAGLIST>>0
 <SEP> <VERTEXDATA2LIST>0
 <TERM>

QUADRILATERAL MESH 3 WITH DATA ::= ARF_QUADMESH3DATA
 <SOFTSEP>
 <FACETDATAFLAG> <SEP>
 <EDGEDATAFLAG> <SEP>
 <VERTEXDATAFLAG> <SEP>
 <I:NUM_ROWS> <SEP>
 <I:NUM_COLUMNS>
 <<SEP> <I:COLOUR_TYPE>>0
 <<SEP> <FACETDatarow>>*<
 <<SEP> <EDGEFLAG2ROW>>*<
 <SEP> <VERTEXDATA3LISTS>
 <TERM>

QUADRILATERAL MESH
WITH DATA

```
 ::= ARF_QUADMESHDATA
    <SOFTSEP>
    <FACETDATFLAG> <SEP>
    <EDGEDATAFLAG> <SEP>
    <VERTEXDATAFLAG> <SEP>
    <I:NUM_ROWS> <SEP>
    <I:NUM_COLUMNS>
    <<SEP> <I:COLOUR_TYPE>>0
    <<SEP> <FACETDAROW>>*
    <<SEP> <EDGEFLAG2ROW>>*
    <SEP> <VERTEXDATA2LISTS>
    <TERM>
```

NON-UNIFORM B-SPLINE
CURVE

```
 ::= ARF_NUNIBSPCURVE
    <SOFTSEP>
    <I:SPLINE_ORDER> <SEP>
    <RLIST:KNOTS> <SEP>
    <R:TMIN> <SEP> <R:TMAX> <SEP>
    < <RATIONAL <SEP>
        <POINTLIST4:CONTROL_POINTS>>
    | <NONRATIONAL <SEP>
        <POINTLIST3:CONTROL_POINTS>>
    >
    <TERM>
```

NON-UNIFORM B-SPLINE
CURVE WITH COLOUR

```
 ::= ARF_NUNIBSPCURVECOLR
    <SOFTSEP>
    <I:SPLINE_ORDER> <SEP>
    <RLIST:KNOTS> <SEP>
    <R:TMIN> <SEP> <R:TMAX> <SEP>
    < <RATIONAL <SEP>
        <POINTLIST4:CONTROL_POINTS>>
    | <NONRATIONAL <SEP>
        <POINTLIST3:CONTROL_POINTS>>
    >
    <<SEP> <COLRCURVE>>0
    <TERM>
```

NON-UNIFORM B-SPLINE
SURFACE

```
 ::= ARF_NUNIBSPSURF
    <SOFTSEP>
    <I:U_ORDER> <SEP>
    <I:V_ORDER> <SEP>
    <RLIST:U_KNOTS> <SEP>
    <RLIST:V_KNOTS> <SEP>
    < <RATIONAL <SEP>
        <POINTLIST4:U_DIRECTION_CONTROL_POINTS>
        <<SEP> <POINTLIST4:U_DIRECTION_CONTROL_PTS>> *
    | <NONRATIONAL <SEP>
        <POINTLIST3:U_DIRECTION_CONTROL_PTS>
        <<SEP> <POINTLIST3:U_DIRECTION_CONTROL_PTS>> *
    >
    <<SEP> TRIMLOOPS <SEP> <TRIMLOOPLIST>> 0
    <TERM>
```

NOTE: Each POINTLIST3 or POINTLIST4 contains control points along the u dimension.

NON-UNIFORM B-SPLINE
SURFACE WITH DATA

```
 ::= ARF_NUNIBSPSURFDATA
    <SOFTSEP>
    <I:U_ORDER> <SEP>
    <I:V_ORDER> <SEP>
    <RLIST:U_KNOTS> <SEP>
    <RLIST:V_KNOTS> <SEP>
    < <RATIONAL <SEP>
        <POINTLIST4:U_DIRECTION_CONTROL_POINTS>
        <<SEP> <POINTLIST4:U_DIRECTION_CONTROL_POINTS>> *
    | <NONRATIONAL <SEP>
        <POINTLIST3:U_DIRECTION_CONTROL_POINTS>
        <<SEP> <POINTLIST3:U_DIRECTION_CONTROL_POINTS>> *
    >
    <<SEP> TRIMLOOPS <SEP> <TRIMLOOPLIST>> 0
    <<SEP> COLRSURF <SEP> <COLRSURF>> 0
    <<SEP> DATASURFS <SEP> <DATASURFLIST>> 0
    <TERM>
```

NOTE: Each POINTLIST3 or POINTLIST4 contains control points along the u dimension.