

# NAG Fortran Library Routine Document

## G05YKF

**Note:** before using this routine, please read the Users' Note for your implementation to check the interpretation of *bold italicised* terms and other implementation-dependent details.

### 1 Purpose

G05YKF generates a log Normal quasi-random number sequence of IDIM dimensions. One of the initialization routines G05YCF, G05YEF or G05YGF must be called beforehand to determine whether a Faure, Sobol or Neiderreiter sequence should be generated.

### 2 Specification

```
SUBROUTINE G05YKF (XMEAN, STD, N, QUASI, IREF, IFAIL)
  INTEGER          N, IREF(406), IFAIL
  double precision XMEAN(*), STD(*), QUASI(N,*)
```

### 3 Description

G05YKF generates a log Normal quasi-random number sequence.

### 4 References

None.

### 5 Parameters

- 1: XMEAN(\*) – *double precision* array *Input*  
**Note:** the dimension of the array XMEAN must be at least IDIM + 1 if IDIM must be odd and at least IDIM otherwise.  
*On entry:* specifies, for each dimension, the mean of the underlying Normal distribution.
- 2: STD(\*) – *double precision* array *Input*  
**Note:** the dimension of the array STD must be at least IDIM + 1 if IDIM must be odd and at least IDIM otherwise.  
*On entry:* specifies, for each dimension, the standard deviation of the underlying Normal distribution.  
*Constraint:*  $STD(i) \geq 0$ .
- 3: N – INTEGER *Input*  
*On entry:* the number of quasi-random numbers required.  
*Constraint:*  $N \geq 1$ .
- 4: QUASI(N,\*) – *double precision* array *Output*  
**Note:** the second dimension of the array QUASI must be at least IDIM + 1 if IDIM must be odd and at least IDIM otherwise.  
*On exit:* contains N quasi-random numbers of dimension IDIM.

5: IREF(406) – INTEGER array *Input/Output*  
*On entry:* contains vital information for the generator.  
*On exit:* updated information for the generation of a further set of quasi-random numbers.  
 IREF must not be changed between calls of G05YKF.

6: IFAIL – INTEGER *Input/Output*  
*On entry:* IFAIL must be set to 0, –1 or 1. If you are unfamiliar with this parameter you should refer to Chapter P01 for details.  
*On exit:* IFAIL = 0 unless the routine detects an error (see Section 6).

For environments where it might be inappropriate to halt program execution when an error is detected, the value –1 or 1 is recommended. If the output of error messages is undesirable, then the value 1 is recommended. Otherwise, if you are not familiar with this parameter the recommended value is 0. **When the value –1 or 1 is used it is essential to test the value of IFAIL on exit.**

## 6 Error Indicators and Warnings

If on entry IFAIL = 0 or –1, explanatory error messages are output on the current error message unit (as defined by X04AAF).

Errors or warnings detected by the routine:

IFAIL = 1  
 On entry, incorrect initialization has been detected.

IFAIL = 3  
 A standard deviation is negative.

IFAIL = 4  
 There have been too many calls to the generator.

## 7 Accuracy

Not applicable.

## 8 Further Comments

None.

## 9 Example

This example calls G05YCF to initialize the generator and then G05YKF to produce quasi-random numbers.

### 9.1 Program Text

```
*      G05YKF Example Program Text
*      Mark 21 Release. NAG Copyright 2004.
*      .. Parameters ..
      INTEGER          NOUT, IDIM, JDIM
      PARAMETER       (NOUT=6, IDIM=4, JDIM=2*IDIM)
*      .. Local Scalars ..
      DOUBLE PRECISION SUM
      INTEGER          I, IFAIL, J
*      .. Local Arrays ..
      DOUBLE PRECISION QUASI(5,JDIM), STD(JDIM), XMEAN(JDIM)
```

```

      INTEGER          IREF(406)
*    .. External Subroutines ..
EXTERNAL          G05YCF, G05YKF
*    .. Intrinsic Functions ..
INTRINSIC          DBLE
*    .. Executable Statements ..
WRITE (NOUT,99999) 'G05YKF Example Program Results'
IFAIL = 0
DO 20 I = 1, JDIM
    XMEAN(I) = DBLE(I)
    STD(I) = 1.0D0
20 CONTINUE
*
CALL G05YCF(IDIM,IREF,IFAIL)
*
SUM = 0.0D0
*
CALL G05YKF(XMEAN,STD,5,QUASI,IREF,IFAIL)
WRITE (NOUT,99998) ((QUASI(I,J),J=1,IDIM),I=1,5)
*
STOP
*
99999 FORMAT (1X,A,F20.4)
99998 FORMAT (1X,4F10.4)
END

```

## 9.2 Program Data

None.

## 9.3 Program Results

```

G05YKF Example Program Results
2.6120    7.6919   129.5899   95.5339
0.1601   126.6900    7.9026   180.2768
0.5492    3.2828    6.8258    36.8717
3.3512    1.9409   20.6616   24.1673
7.3708    6.2979   29.9591   48.6792

```

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