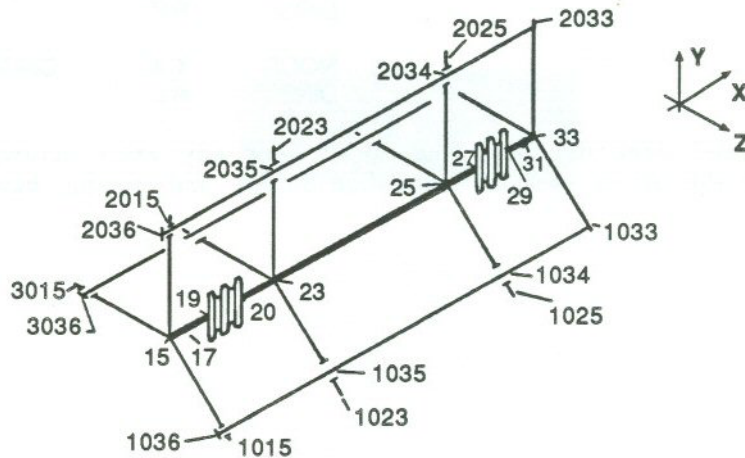


## Universal Joint - Comprehensive Tie Rod

The comprehensive universal joint model involves defining, as accurately as possible; all tie rods and connections between tie rods and end plates.



The following groups illustrate the method used in constructing the universal expansion joint model shown above.

-Rigid Elements (Flanges) -

15-17 / 31-33

-Rigid Elements normal to the pipe axis and between the pipe and tie bar centerlines.

At the end where there are nuts on either side of the flange, fixing the tie-bar to the flange:

33-1033 / 33-2033 / 33-3033

-Rigid Elements normal to the pipe axis, and between the pipe and tie-bar centerlines.

At the end where there are nuts only on the backside of the flange:

15-1015 / 15-2015 / 15-3015

—Intermediate lateral tee supports (Rigid) -

23-1023 / 23-2023 / 23-3023

25-1025 / 25-2025 / 25-3025

—Tie-bars -

1033-1034-1035-1036

2033-2034-2035-2036

3033-3034-3035-3036

- Restraints with connecting nodes at the tension-only flange end.—

RESTR NODE = 1036 CNODE = 1015 TYPE = -X , Y , Z

RESTR NODE = 2036 CNODE = 2015 TYPE = -X , Y , Z

RESTR NODE = 3036 CNODE = 3015 TYPE = -X , Y , Z

- Restraints with connecting nodes at the intermediate support points.

RESTR NODE = 1035 CNODE = 1023 TYPE = Y , Z

RESTR NODE = 2035 CNODE = 2023 TYPE = Y , Z

RESTR NODE = 3035 CNODE = 3023 TYPE = Y , Z

RESTR NODE = 1034 CNODE = 1025 TYPE = Y , Z

RESTR NODE = 2034 CNODE = 2025 TYPE = Y , Z

RESTR NODE = 3034 CNODE = 3025 TYPE = Y , Z