

TEST TYPE:	ASTM 380
TESTING AUTHORITY:	AMERICAN SOCIETY TESTING MATERIALS
TEST NAME:	DEAD LOAD TEST
TEST DATE:	AUGUST 29, 2001
TEST COMPLETED BY:	TOM SHINGLER
TESTING LABORATORY	DESIGN DYNAMICS
PANEL TYPE:	1 1/2 MECHANICAL LOCK
PANEL WIDTH:	16 INCH WIDE
CLIP SPACING:	36 IN
DECKING CONSTRUCTION:	5/8 PLYWOOD

PURPOSE OF TEST:

THIS TEST SEQUENCE EVALUATED THE STRENGTH AND RESILIENCY OF THE BROAD-FLAT PORTIONS OF A METAL ROOF PANEL WHEN EXPOSED TO VERY CONCENTRATED POINT LOADS INDUCED BY INCIDENTAL FOOT TRAFFIC OCCURRING AT CRITICAL LOCATIONS.

PANEL DESIGNATION: STRUCTURAL STANDING SEAM

MANUFACTURER: METALFORMING, INC.

FIELD SEAMED (Y/N): YES

SEAM TYPE: FIVE (5) PLY DOUBLE-LOCK

PANEL WIDTH: 16.00 IN.

PANEL DEPTH: 1.554 IN.

PANEL GAGE: 24 GAGE (T= 0.0225 IN.)

PANEL MATERIAL: LIGHT-GAGE STEEL @ FY (MIN) = 50 + KSI

PANEL STIFFENERS: NO

CLIP STYLE: STANDARD TWO (2) PIECE SLIDING HOOK (REFER TO PHOTO 1)

TEST PANEL LENGTH: 15.50 FT.

NO. OF TEST PANELS: FIVE (5) PANELS WIDE WITH THE VARIOUS LOAD AND LOAD LOCATIONS BEING APPLIED TO THE CENTER PANEL (SEE ENCLOSED SKETCH).

PURLIN SPACINGS: A.A SERIES OF THREE (3) 5 FT. SPANS WITH THE ROOF PANEL BEING CONTINUOUS OVER THE PURLIN MEMBERS. LOADING THE INTERIOR 5 FT. SPAN SIMULATES THE PANEL BEHAVIOR UNDER POINT LOAD IN THE "FIELD" OF THE ROOF WHERE NO END-OF-PANEL EFFECTS ARE TO BE REALIZED.

B.A "WORST-CASE" END SPAN @ 5 FT., SIMULATING "LEADING/TRAILING EDGE PURLINS WHICH DO NOT REQUIRE SPACINGS CLOSER THAN 5 FT. ON-CENTERS.
C.A LOAD APPLIED OVER A PURLIN LOCATION TO DEMONSTRATE THAT THE BROAD-FLAT OF THE PANEL TOUCHES DOWN (AND DOES NOT BUCKLE) ONTO THE PURLIN FLANGE WHEN A CONCENTRATED LOAD IS APPLIED AT THE MID POINT OF THE BROAD-FLAT.

END-OF-PANEL FASTENING:

THE EXTREME ENDS OF EACH TEST PANEL WERE POSITIVELY FASTENED WITH FOUR (4) EQUALLY-SPACED #14 HEX HEAD SCREWS WITH 5/8" DIAMETER COMBINATION STEEL/EPDM BONDED WASHERS. THIS SIMULATED THE POSITIVE END FASTENING TECHNIQUE STANDARD WITH FIELD-SEAMED METAL ROOF SYSTEMS.

ABOUT THE TEST: FIVE (5) 24 GAGE STEEL STANDING SEAM PANELS @ 16" WIDE X 15.50 FT. LONG WERE CLIP-INSTALLED OVER THREE (3) INTERIOR PURLINS AND THE ENDS OF THE TEST PANELS WERE INSTALLED "CLIPLESS", WITH THE BROAD-FLAT OF THE PANELS BEARING ON SUPPORTS SUCH AS WHAT WOULD OCCUR AT AN EAVE DETAIL.

THE PANELS WERE FIELD-SEAMED USING THE STANDARD POWER SEAMER AS SUPPLIED AND ADJUSTED BY THE MANUFACTURER.

THE TEST SETUP SIMULATED CONTINUOUS SPANS AT 5.00 FT. ON-CENTERS AS WELL AS CRITICAL END SPAN CONDITIONS AT A WORST-CASE SPACING OF 5.00 FT. A PRECISE 380# LOAD WAS THEN APPLIED AT THREE (3) CRITICAL BROAD-FLAT LOCATIONS AS DEPICTED IN THE ENCLOSED SKETCH.

THE LOCATIONS ARE AS FOLLOWS.....

- POSITION 1: CENTER OF 5.00 FT. END SPAN
- POSITION 2: CENTER OF 5.00 FT. SPAN
- POSITION 3: DIRECTLY OVER PURLIN LOCATION

EQUIPMENT: REFER TO PHOTO 2

1. A 0 TO 1000 PSI OCI HYDRAULIC GAGE WITH A "MAX-HOLD" NEEDLE.
2. A PC55 ENERPAC HYDRAULIC CYLINDER (SET TO PUSH) WITH ONE (1) SQUARE INCH OF ACTIVE PISTON AREA.
3. A P141 ENERPAC HYDRAULIC HAND PUMP
4. A 4" X 4" LOAD APPLICATION PAD AT THE END OF A PISTON ROD EXTENSION.

5. A STEEL TUBE FRAME TO STRADDLE THE TEST PANEL ASSEMBLY AND SUPPORT THE HYDRAULIC EQUIPMENT.

TEST TECHNIQUE: A 380# LOAD, DELIVERED WITHIN THE CONFINES OF A 4 X 4 LOAD APPLICATION PAD, WAS APPLIED AT VARIOUS CRITICAL PANEL BROAD-FLAT LOCATIONS FOR A ONE (1) MINUTE PERIOD EACH. OBSERVATIONS WERE MADE DURING THE LOAD APPLICATION AS WELL AS AFTER THE REMOVAL OF THE LOAD. THIS TEST EVALUATED THE BUCKLING RESISTANCE OF THE PANEL BROAD-FLAT UNDER THE INFLUENCE OF HIGHLY CONCENTRATED LOADS AS WELL AS THE BROAD-FLAT RESILIENCY. THE TERM "RESILIENCY", IN THE CONTEXT OF THIS TEST SERIES, MEANS DEMONSTRATING OF ABILITY TO RESTORE TO ORIGINAL POSITION AFTER REMOVAL OF LOAD..... WITH NO APPARENT SIGNS OF LOCALIZED DISTRESS.

TEST RESULTS: UTILIZING A 380 # CONCENTRATED LOAD IN EACH INSTANCE AND APPLIED FOR A ONE (1) MINUTE TIME PERIOD.

1 1/2" STANDING SEAM @ 16" WIDE X 24 GAGE STEEL			
LOADING CONDITION	LOAD POSITION	OBSERVATIONS	PHOTO
5.00 FT. END SPAN	CENTER OF SPAN	NO DAMAGE	3
5.00 FT. CENTER SPAN	CENTER OF SPAN	NO DAMAGE	4
DIRECTLY OVER PURLIN	DIRECTLY OVER PURLIN	NO DAMAGE	5