

<p style="text-align: center;">DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Housing - Federal Housing Commissioner</p> <p>TO: DIRECTORS, SINGLE FAMILY HOCs DIRECTORS, MULTIFAMILY HUBs</p>	<p>STRUCTURAL ENGINEERING BULLETIN NO. 1129 Rev. 1 (Supersedes issue dated January 14, 2002)</p>				
<p>ISSUE DATE April 11, 2006</p>	<p>REVIEW DATE April 11, 2009</p>				
<p>SUBJECT:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 15%; vertical-align: top;">1. Item Description</td> <td>NASCOR III Wall System</td> </tr> <tr> <td style="vertical-align: top;">2. Name and address of Manufacturer</td> <td>NASCOR Ltd. 1212 34th Avenue Calgary, Alberta, Canada T2G1V7</td> </tr> </table>		1. Item Description	NASCOR III Wall System	2. Name and address of Manufacturer	NASCOR Ltd. 1212 34 th Avenue Calgary, Alberta, Canada T2G1V7
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This Structural Engineering Bulletin (SEB) should be filed with other SEBs and related Bulletins on materials or products as required by prescribed procedures.

The technical description, requirements and limitations expressed herein do not constitute an endorsement or approval by the Department of housing and Urban Development (HUD) of the subject matter, and any statement or representation, however made, indicating approval or endorsement by HUD is unauthorized and false, and will be considered a violation of the United States Criminal Code, 18 U.S.C. 709.

NOTICE: THIS BULLETIN APPLIES TO DWELLING UNITS BUILT UNDER HUD HOUSING PROGRAMS. NON-HUD-INSURED UNITS MAY OR MAY NOT BE IN CONFORMINTY WITH THE REQUIREMENTS OF THE HUD MINIMUM PROPERTY STANDARDS.

Any reproduction of this Bulletin must be in its entirety and any use of all or any part of this Bulletin in sales promotion or advertising is prohibited.

1. General:

This Bulletin sets forth specific requirements under the Technical Suitability of Products Program for determining the eligibility of housing to be constructed under HUD mortgage insurance, or other HUD housing programs.

2. Scope:

This Bulletin applies only to the structural features of this method of construction. Final determination of eligibility is made by the appropriate HUD Field Office. Other factors considered by the Field Office will be valuation, location, architectural planning and appeal, mechanical equipment, thermal characteristics, and market acceptance. Consideration is also necessary to determine whether a specific property will qualify under the specific HUD program, when constructed according to the method outlined in this Bulletin, and where the structure is to be located.

In geographical areas subject to hurricanes, earthquakes, or other severe conditions affecting dwelling structures, the HUD Field Office or Homeownership Center shall require additional safeguards in proposed designs, when necessary.

3. Minimum Property Standards (MPS):

Compliance with HUD MPS will be determined by the HUD Field Office or Homeownership Center on the same basis as submissions involving conventional construction, except for the special features described in this Bulletin.

4. Inspection:

Field compliance inspections covering conventional items of construction and any special features covered in this Bulletin shall be made in accordance with prescribed procedures.

The appropriate HUD Field Office or Homeownership Center shall furnish a copy of a HUD field inspection report to Headquarters, FHA Standards, Office of Manufactured Housing Programs, when there is:

- a. Evidence of noncompliance with portions of the system of construction described in this Bulletin.
- b. Faulty shop fabrication, including significant surface defects.
- c. Damage to shop fabricated items or materials due to improper transportation, storage, handling or assembly.
- d. Unsatisfactory field workmanship or performance of the product or system.
- e. Any significant degradation or deterioration of the product or evidence of lack of durability or performance.

Periodic plant inspections will be made by HUD Field Office, Homeownership Center, State Agency personnel, or a HUD designated representative in accordance with their prescribed procedures. Factory inspection reports shall be submitted to HUD Headquarters, upon request.

5. Certification:

The manufacturer named in this Bulletin shall furnish the builder with a written certification stating that the product has been manufactured in compliance with the HUD Minimum Property Standards (MPS), except as modified by this Bulletin. The Builder shall endorse the certification with a statement that the product has been erected in compliance with the HUD MPS except as modified by this Bulletin, and that the manufacturer's certification does not relieve the Builder, in any way, of responsibility under the terms of the Builder's Warranty required by the National Housing Act, or under any provisions applicable to any other housing program. This certification shall be furnished to the HUD Field Office upon completion of the property.

OUTLINE DESCRIPTION, CATEGORY II CONSTRUCTION

GENERAL:

The NASCOR III wall system is a prefabricated wall panel intended for use as an above grade exterior load-bearing wall. The primary components of the wall system are wood I-studs and expanded polystyrene (EPS) insulation infill panels, with factory installed single solid sawn lumber top and bottom plates.

All materials and methods of installation shall be in accordance with HUD Minimum Property Standards (MPS), Use of Materials Bulletins (UM), and Materials Releases (MR), except as may be specifically noted herein. Plumbing, heating and electrical systems are field installed and connected.

This Bulletin is based upon a structural review of the prefabricated wall panels of NASCOR Ltd., but may be considered applicable to all structurally similar units of this company. Foundation design, dwelling design, and nonstructural items (such as architectural, plumbing, heating and electrical features) are not covered by this Bulletin.

SPECIFICATIONS:

Form HUD-92005, "Description of Materials" specifying only the structurally related items (Nos. 1 to 12, 14, 26, and 27), as originally submitted for determination of technical suitability, describes the materials that shall be used in construction of housing units under this system of construction. Form HUD-92005, furnished with each application for use under HUD housing programs, shall include as a minimum the same structural materials.

DRAWINGS:

The following drawing(s) by NASCOR Ltd. shall be considered an integral part of this Bulletin:

<u>Drawing No.</u>	<u>Date</u>	<u>Description</u>
Figure 1	July 2001	Nascor III Wall System
Figure 2	July 2001	Cross-Section of Nascor III Columns
Figure 3	July 2001	Nascor Infill Panel and Spline

The Builder shall submit construction drawing(s) to the HUD Field Office or Homeownership Center with each application under HUD housing programs, which shall include the same or similar structural features as shown on the drawings listed above. Copies of these listed drawings shall also be furnished to the HUD Field Office or Homeownership Center by the Builder upon request.

SPECIAL CONSTRUCTION FEATURES:

NASCOR III wall system, nominal 8 to 16 feet high and 8 to 16 feet wide, are furnished in this method of construction. System consists of: (1) wood I-studs, (2) expanded polystyrene (EPS) insulation infill panels, (3) lumber top and bottom plates, and (4) fasteners.

1. NASCOR III I-studs are prefabricated wood I-studs with structural wood flanges and a 3/8 inch thick oriented strand board (OSB) web. The I-studs are available in depths of 5-1/2 and 7-1/4 inches.
2. Insulation infill panels shall be 5-1/2 or 7-1/4 inch thick by 92-13/16 inch high, Type 1, expanded polystyrene (EPS) produced from beads provided by BASF Corporation or Huntsman Chemical Corporation. The density is 1.0 pcf. The widths of the panels are 9-1/2, 13-1/2, and 21-1/2 inches for I-stud spacings of 12, 16, and 24 inches on center respectively. Each end of the panel is profiled to accept an EPS spline. The interior face of each panel has a 1 inch wide by 1-3/4 inch deep channel located 24 inches from the bottom of the panel. This channel, referred to as the electrical keyway aligns the 1-1/2 in. diameter opening in the I-studs to provide a continuous path through which electrical wiring can be installed. Foam insulation shall be separated from all inhabited and finished spaces by a thermal barrier that will stay in place after 15 minutes of fire exposure.

3. Each fabricated wall panel is joined together by fasteners and a top and bottom plate. The plates consist of nominal 2 x 6 or 2 x 8 inch dimension lumber, depending on the thickness of the wall panel. Where the bottom of the plate is to be supported on a concrete or masonry foundation the lumber shall be naturally durable or pressure treated.
4. Fasteners connecting the wood components of the wall system shall comply with Table 8 of this report. The fasteners used to connect the naturally durable or pressure treated bottom plate to the I-studs shall be hot-dipped zinc coated galvanized, stainless steel, silicon bronze, or copper.

DESIGN AND CONSTRUCTION REQUIREMENTS:

Design Loads: The method described in this Bulletin is based on a Basic Wind Speed range of 70 - 110 mph and Exposure B, C, and D in accordance with ASCE 7-88.

The Builder shall submit structural calculations to the local HUD Office or Homeownership Center for wall assemblies which are to include openings in the system.

The Builder shall submit structural calculations to the local HUD Office or Homeownership Center if housing units are to be located in geographical areas where these conditions are exceeded.

Table 1 – WOOD MEMBER DESCRIPTIONS

Component	Size	Length	Species & Grade^{1,2}
Cripple & corner studs	2x6 (R-20) 2x8 (R-30)	92-5/8 in. Greater than 92-5/8 in. Up to 192 in.	Spruce-pine-fir stud grade Spruce-pine-fir No. 1 or 2
Top & bottom plates, sills	2x6 (R-20) 2x8 (R-30)	Varies	Spruce-pine-fir No. 1 or 2
I-studs	2x3	92-5/8 in. to 192 in.	Spruce-pine-fir No. 1 or 2
Lintels	2x10 or 2x12	Varies	Spruce-pine fir No. 1 or 2 Douglas-fir-larch No. 1 or 2

Notes:

1. Lumber is graded under standards recognized by the American Lumber Standards Committee (ALSC) or equivalent.
2. Lumber for I-stud column flanges is one-piece or finger jointed and meets requirements of NLGA Special Products Standard 1 (SPS-1).

**Table 2 – Nascor R20 & R30
Column Design Properties**

Allowable Moment (ft-lbs)	Stiffness (x10⁶ lbs-in²)	Compressive Strength (psi)
897	32.5	1150

Notes:

1. Structural design properties for R20 and R30 columns are to be the same, and are based upon R20 capacities.
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**Table 3 – Nascor R20
Column Section Properties**

Area (in.²)	Moment of Inertia (in.⁴)	Section Modulus (in.³)
7.50	23.214	8.44

Notes:

1. Section properties are noted ignoring the web and the notch in the flange.
2. Structural design properties for R20 and R30 columns are to be the same, and are based upon R20 capacities.

Table 4
Total Allowable Gravity Load (plf)
for R20 and R30 Columns for Exposure Class B

Height (ft)	Spacing (in.)	BASIC WIND SPEED (mph) = (V)						
		70	75	80	85	90	100	110
6	12	9872	9872	9872	9872	9872	9872	9872
6	16	7404	7404	7404	7404	7404	7404	7404
6	24	4936	4936	4936	4936	4936	4936	4936
7	12	9152	9152	9152	9152	9152	9152	9152
7	16	6864	6864	6864	6864	6864	6864	6864
7	24	4576	4576	4576	4576	4576	4576	4550
8	12	8289	8289	8289	8289	8289	8289	8193
8	16	6216	6216	6216	6216	6216	6055	5860
8	24	4031	4031	4031	3985	3903	3738	3564
9	12	7159	7159	7159	7098	6994	6781	6562
9	16	5171	5171	5171	5117	5021	4829	4628
9	24	3214	3214	3214	3165	3083	2914	2738
10	12	5832	5832	5832	5771	5668	5485	5241
10	16	4178	4178	4178	4124	4031	3841	3645
10	24	2555	2555	2555	2508	2427	2262	2089
11	12	4774	4774	4774	4715	4615	4412	4615
11	16	3391	3391	3391	3338	3248	3066	2877
11	24	2039	2039	2039	1993	1915	1755	1587
12	12	3937	3937	3937	3882	3786	3592	3392
12	16	2772	2772	2772	2721	2636	2460	2279
12	24	1635	1635	1635	1591	1516	1361	1197
13	12	3273	3273	3273	3220	3128	2943	2752
13	16	2282	2282	2282	2234	2151	1983	1808
13	24	1317	1317	1317	1275	1202	1051	--
14	12	2741	2741	2741	2690	2603	2425	2241
14	16	1890	1890	1890	1844	1766	1603	1433
14	24	1064	1064	1064	1023	952	--	--
15	12	2311	2311	2311	2262	2178	2007	1829
15	16	1574	1574	1574	1530	1454	1296	--
15	24	860	860	860	--	--	--	--

Notes:

1. The total allowable gravity loads given in the table are per lineal foot of wall (plf).
2. A wind importance factor (I) of 1.00 was used in determining the wind load.
3. Design wind loads were determined in accordance with the main windforce resisting system.
4. Dashed entries correspond to designs which do not meet the L/240 deflection limit and/or exceed the allowable bending moment.

Table 5
Total Allowable Gravity Load (plf)
for R20 and R30 Columns for Exposure Class C

Height (ft)	Spacing (in.)	BASIC WIND SPEED (mph) = (V)						
		70	75	80	85	90	100	110
6	12	9872	9872	9872	9872	9872	9872	9872
6	16	7404	7404	7404	7404	7404	7404	7404
6	24	4936	4936	4936	4936	4936	4936	4636
7	12	9152	9152	9152	9152	9152	9152	9152
7	16	6864	6864	6864	6864	6720	6836	6563
7	24	4576	4576	4576	4484	4371	4134	3883
8	12	8289	8289	8250	8106	7956	7647	7326
8	16	6170	6044	5913	5780	5643	5358	5061
8	24	3840	3727	3612	3492	3370	3114	2846
9	12	6912	6768	6621	6472	6318	6003	5677
9	16	4949	4817	4673	4547	4408	4120	3820
9	24	3018	2903	2786	2666	2543	2284	2011
10	12	5587	5445	5300	5153	5003	4695	4375
10	16	3957	3829	3698	3566	3428	3146	2852
10	24	2363	2251	2136	2018	1896	1640	1364
11	12	4537	4400	4261	4119	3975	3676	3366
11	16	3179	3055	2928	2800	2668	2393	2103
11	24	1854	1745	1633	1518	1398	1142	--
12	12	3711	3580	3446	3310	3172	2883	2582
12	16	2568	2449	2328	2204	2075	1807	--
12	24	1457	1351	1242	1129	--	--	--
13	12	3057	2932	2804	2673	2539	2260	1965
13	16	2087	1973	1856	1735	1610	--	--
13	24	1144	1042	--	--	--	--	--
14	12	2535	2414	2291	2165	2036	--	--
14	16	1703	1593	1479	1361	--	--	--
14	24	896	--	--	--	--	--	--
15	12	2112	1997	1878	1756	--	--	--
15	16	1393	1286	--	--	--	--	--
15	24	--	--	--	--	--	--	--

Notes:

1. The total allowable gravity loads given in the table are per lineal foot of wall (plf).
2. A wind importance factor (I) of 1.00 was used in determining the wind load.
3. Design wind loads were determined in accordance with the main windforce resisting system
4. Dashed entries correspond to designs which do not meet the L/240 deflection limit and/or exceed the allowable bending moment.

Table 6
Total Allowable Gravity Load (plf)
for R20 and R30 Columns for Exposure Class D

Height (ft)	Spacing (in.)	BASIC WIND SPEED (mph) = (V)						
		70	75	80	85	90	100	110
6	12	9872	9872	9872	9872	9872	9872	9872
6	16	7404	7404	7404	7404	7404	7404	7404
6	24	4936	4936	4936	4936	4936	4904	4635
7	12	9152	9152	9152	9152	9152	9101	8734
7	16	6864	6864	6864	6864	6720	6394	6048
7	24	4569	4440	4308	4170	4027	3727	3883
8	12	8218	8047	7873	7694	7510	7129	6730
8	16	5883	5726	5566	5400	5231	4879	4508
8	24	3584	3445	3301	3153	3000	2679	2335
9	12	6587	6412	6233	6050	5863	5478	5076
9	16	4652	4493	4330	4163	3992	3636	3260
9	24	2759	2618	2473	2323	2168	1840	1482
10	12	5266	5095	4920	4740	4558	4180	3783
10	16	3668	3512	3353	3188	3020	2669	2294
10	24	2110	1971	1828	1679	1523	1189	--
11	12	4229	4063	3894	3721	3544	3176	2786
11	16	2900	2749	2594	2434	2270	1922	--
11	24	1607	1471	1330	1181	--	--	--
12	12	3415	3256	3094	2926	2755	2395	--
12	16	2300	2154	2004	1847	1686	--	--
12	24	1217	1083	--	--	--	--	--
13	12	2774	2621	2464	2302	2135	--	--
13	16	1828	1687	1540	--	--	--	--
13	24	--	--	--	--	--	--	--
14	12	2535	2115	1962	1804	--	--	--
14	16	1453	--	--	--	--	--	--
14	24	--	--	--	--	--	--	--
15	12	1850	1706	--	--	--	--	--
15	16	--	--	--	--	--	--	--
15	24	--	--	--	--	--	--	--

Notes:

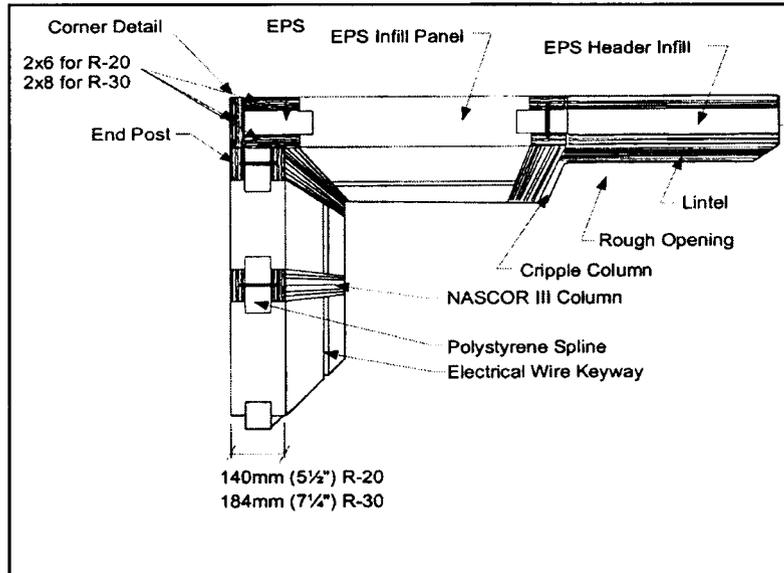
1. The total allowable gravity loads given in the table are per lineal foot of wall (plf).
2. A wind importance factor (I) of 1.00 was used in determining the wind load.
3. Design wind loads were determined in accordance with the main windforce resisting system.
4. Dashed entries correspond to designs which do not meet the L/240 deflection limit and/or exceed the allowable bending moment.

Table 7 – Maximum Allowable Shear Values (plf) for Wood Structural Panel Shear Walls with Framing of Nascor III Columns

Column Spacing	Fastening	Sheathing	Allowable Shear
24 in. on center	2-1/2 in. common nails spaced at 3 in. on center at panel perimeter and 12 in. on center at intermediate supports	5/16 in. thick OSB	250
24 in. on center	1-5/8 in. gypsum board screws at 4 in. on center	1/2 in. thick vertical gypsum wallboard	125
24 in. on center	1-5/8 in. gypsum board screws at 7 in. on center	1/2 in. thick vertical gypsum wallboard	100

Table 8 - Fasteneing Schedule

Connection	Fastener
Top plate to I-stud (end screw)	2 - 3 in. long wood screw
I-stud to bottom plate (end screw)	2 - 3 in. long wood screw
Cripples to lintel (end screw)	2 - 3 in. long wood screw
Doubled lintel (face nail)	5 in. long spiral nail - 2 rows @ 16 in. o.c.
Top plate to lintel (face screw)	3 in. long wood screw @ 16 in. o.c.
Sill plates to cripples (toe screw)	2 - 3 in. long wood screw @ each end
I-stud to end post (face screw)	3 in. long wood screw @ 24 in. o.c.
Corner connection (toe nail)	3-1/4 in. long common wire nails @ 16 in. o.c.



**Figure 1
NASCOR III WALL SYSTEM**

MANUFACTURING PLANT(S):

Wall panels covered under this Bulletin will be produced in the following plant:

NASCOR Ltd.
1212 34th Avenue
Calgary, Alberta, Canada T2G1V7
Ph. 403-243-8919

The appropriate HUD Field Office or Homeownership Center in whose jurisdiction the manufacturing plant is located, or HUD designated representative will inspect this plant in accordance with prescribed procedures.

QUALITY CONTROL:

The appropriate HUD Field Office or Homeownership Center in whose jurisdiction the manufacturing plant is located, or the State Agency (in Category III states) shall review and approve plant fabrication procedures and quality control program, to ensure compliance with approved plans and specifications. The quality control program shall include field erection or supervision by NASCOR Ltd.

RECORD OF PROPERTIES:

The manufacturer shall provide HUD a list of the first ten properties in which the component or system described in this Bulletin is used. The list shall include the complete address, or description of location, and approximate date of installation or erection. Failure of the manufacturer to provide HUD with the above information may result in cancellation of this Bulletin.

NOTICE OF CHANGES:

The manufacturer shall inform HUD in advance of changes in production facilities, transportation, field erection procedures, design, or materials used in this product. Further, the manufacturer must inform HUD of any revision to corporate structure, change of address or change in name or affiliation of the prime manufacturer. Failure of the manufacturer to notify HUD of any of the above changes may result in cancellation of this Bulletin.

EVALUATION:

This SEB is valid for a period of three years from the date of initial issuance or most recent renewal or revision, whichever is later. The holder of this SEB shall apply for a renewal or revision 90 days prior to the Review Date printed on this SEB. Submittals for renewal or revision shall be sent to:

U. S. Department of Housing and Urban Development
FHA Standards, Office of Manufactured Housing Programs
451 Seventh Street, SW, Room 9168
Washington, DC 20410-8000

Additionally, the appropriate User Fee shall be sent to:

U. S. Department of Housing and Urban Development
Miscellaneous Income – Technical Suitability of Products Fees
Bank of America
P. O. Box 198762
Atlanta, GA 30384-8762

The holder of this SEB may apply for revision at any time prior to the Review Date. Minor revisions may be in the form a supplement.

If the Department determines that a proposed renewal or supplement constitutes a revision, the appropriate User Fee for a revision will need to be submitted in accordance with Code of Federal Regulations 24 CFR 200.934, "User Fee System for the Technical Suitability of Products Program", and current User Fee Schedule.

CANCELLATION:

Failure to apply for a renewal or revision shall constitute a basis for cancellation of the SEB. HUD will notify the manufacturer that the SEB may be canceled when:

1. conditions under which the document was issued have changed so as to affect production of, or to compromise the integrity of the accepted material, product, or system,
2. the manufacturer has changed its organizational form without notifying HUD, or
3. the manufacturer has not complied with responsibilities it assumed as a condition of HUD's acceptance.

However, before cancellation, HUD will give the manufacturer a written notice of the specific reasons for cancellation, and the opportunity to present views on why the SEB should not be canceled. No refund of fees will be made on a canceled document.

This Structural Engineering Bulletin is issued solely for the captioned firm and is not transferable to any person or successor entity.
