



GRAFTech

International

PRODUCT DEFINITIONS GRADES UMP™, USG™ AND UCB™ CARBON BLOCKS & SHAPES

In the manufacture of carbon blocks and shapes, quality controls are imposed from raw material selection through final packaging of finished product to maintain consistency and to minimize product variation. The user can be confident that standards for quality and uniformity have been met and that product variations are consistent with those historically observed.

Product grades are defined on the basis of controlled raw materials processed through defined standard manufacturing processes and meeting certain ranges of product properties. The following essential properties are routinely measured for control purposes:

Carbon beam and block - Bulk Density, Crushing Strength, and Ash.

Many additional properties can be measured on refractory products. For products having standard raw materials processed in a standard procedure, these additional properties will be found to correlate with the essential control properties listed above. This specification distinguishes between essential control properties that provide a basis for acceptance/rejection and informational properties that are not routinely measured and are provided for information only. Examples of informational properties include modulus of rupture, dimensional change during reheat, porosity, and thermal conductivity.

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TECHNICAL INFORMATION
RPD-08 JANUARY, 2008

This information is based on data believed to be reliable but GrafTech makes no warranties, express or implied, as to its accuracy and assumes no liability arising out of its use. The data listed falls within the normal range of product properties but should not be used to establish specification limits or used alone as the basis of design. GrafTech's liability to purchasers is expressly limited to the terms and conditions of sale. NMA, HotPressed, NMD, NML, NMP, NMH, CJR, CS, CSX, CBY, GradeD, UCB, RP3, RP4, EZRam, SmartRam, CP9, C34, C38, C46, and GR37 are all trademarks of GrafTech International Holdings Inc. ©2008 GrafTech International Holdings Inc.



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Further acceptance/rejection criteria covered by this specification include dimensional conformity, workmanship, and dry assembly inspection (optional). An indication of standard packaging methods is also provided. During manufacturing, internal inspection procedures and sampling frequencies are used to assure the quality of the final product. Historically, these procedures have resulted in product which consistently meets lot acceptance inspection by customers using plans such as ISO-5022 at a 4% AQL level.

A. Properties (Physical & Chemical)

Essential & Informational Properties are given in the attached product definition sheets, along with the associated test methods.

B. Dimensional Conformity

1. Hearth Bottoms:

- a. Length, Width, Thickness, Squareness, Warpage.
- b. Method of Measurement - Framing square, steel rule, and micrometer.

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c. Acceptance/Rejection Criteria

1. "As Extruded"

Length - +2" (50.8 mm) to +5" (127.0 mm)

Width - +/- 2% (Except 24" x 48" stock +2% to +4%)

Thickness - +/- 2% (Except 24" x 48" stock + 4% to +8%)

Curvature - 1/2% of Length maximum. 1% of Width maximum.

Corner Radius - 1" (Except 1/2" on 4" x 11" and 24" x 48")

2. Standard Machining

Length - Nominal +/- 1/8" (3.2 mm)

Width and Thickness - Nominal +/- 1/16" (1.6 mm)

Squareness -

Sides - 3/32" (2.4 mm) maximum.

Critical Ends - 1/16" (1.6 mm) maximum.

Non-Critical Ends - 1/8" (3.2 mm) maximum.

Warpage - Sides and critical ends shall not deviate more than 3/32" (2.4 mm) from a true plane surface. Non-critical ends shall not deviate more than 1/8" (3.2 mm) from a true plane surface.

3. Close Tolerance Machining

Length - +/- 0.125" (3.2 mm)

Width and Thickness - +/- 0.020" (0.5 mm)

Squareness (Sides) - +/- 1/32" (0.8 mm)

(Critical Ends) - +/- 1/16" (1.6 mm)

(Non-Critical Ends) - +/- 1/8" (3.2 mm)

Warpage (deviation from true flat plane)

Sides and Critical Ends - +/- 1/32" (0.8 mm)

Warpage - Non-Critical Ends - +/- 1/8" (3.2 mm)

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2. Accessories, Troughs, Tuyere Blocks, Cupola Linings
 - a. In lieu of blueprint requirements, the following tolerances will apply based on the type of machined surface present.
 - Planned to Planned +/- 1/16" (1.6 mm)
 - Planned to Sawed +/- 1/8" (3.2 mm)
 - Sawed to Sawed +/- 1/8" (3.2 mm)
 - Machined to Nominal +/- 1/2" (12.7 mm)
 - Nominal to Nominal +/- 2%

C. Workmanship - Hearth Bottoms, Accessories, Troughs, etc.

1. Edge and corner chips on butt and outside ends.
2. Method of measurement - Tape or steel rule.
3. Acceptance/Rejection Criteria
 - a. Edge Chips - Maximum of four chips allowed with sum of depth and width not to exceed 1/2" (12.7 mm). Maximum length is 2" (50.8 mm). Maximum repairable chips are 2 per block, up to 48 square inches (30968 square mm) each by product of width and length. Maximum depth is 2" (3.1 square mm). Two chips of this type on same edge are not permitted.

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- b. Corner Chips - Maximum of four chips allowed with sum of depth and width not to exceed 1/2" (12.7 mm). Maximum length is 2" (50.8 mm). Maximum repairable chips is one per block, up to 3" (76.2 mm) wide x 3" (76.2 mm) deep x 6" (152.4 mm) long.

D. Dry Assembly Inspection (Optional)

Dry assembly prior to shipment is optional. If this is required by customer, then assembly procedures and specifications can be discussed as part of the order entry process.

E. Packaging

Extruded Shapes (Hearth Bottoms and Accessories)

1. Domestic - Product is steel banded to three stringer hardwood pallet with annular nail construction, or banded to 4 x 4 (100 x 100 mm) stringers as appropriate based on size of item. Heavy duty cardboard edge and corner protection between bands and product.
2. Export - Product is steel banded to 4x4 (100 x 100 mm) stringers as appropriate based on size of item. Each piece is then packaged using 1 x 4 (25 x 100 mm) wooden edge and corner protection. Then these pieces are packed into large shipping containers to protect the product from shipping location to the customer.
3. Identification - UCAR Tracer Number and Piece Number stenciled on end and top of each piece.

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