REVISIONS:

Rev	By	Date	Pages Revised or Added P ¿

6 & 2 3 (

) R U P

This detail specification along with the base material specification NMS 401 establishes the requirements for carbon fiber fabric powdered with a PEEK (Evonik Vestakeep 2000 FP) thermoplastic (ñfabric Semipregò). The semipreg is produced using a powdering process on both sides of the fabric and its consolidated laminate form.

& O D V V L I Product qualified to this detail specification have the following classification: Type 42, Class 2, Grade 284, Style 3K-5HS ï semi-preg or Type 42, Class 3, Grade 284, Style 3K-5HS ï laminate

7 (& + 1 , & $ / 5 (4 8 , 5 (0 (1 7 6

Table 1 ï Semi-preg Physical and Chemical Properties (Class 2)

Property	Test Method(1)	Number of Replicates	Requirements
Semi-preg Areal Weight	EN 2557 or ASTM D3776	Each Lot/Batch(2)	485Ñ15 gsm (ind.) 485Ñ12 gsm (avg.)
Fiber Areal Weight	EN2557 or ASTM D3529(4)	Each Lot/Batch(2)	284Ñ6 gsm (ind.) 284Ñ5 gsm (avg.)
TP Weight Content	EN 2559[3] or ASTM D3529(4)	Each Lot/Batch(2)	42Ñ3 wt.% (ind.) 42Ñ3 wt.% (avg.)
Thickness(5) (Optional)	ASTM D3171	10 Measurements Each Lot/Batch	0.0117 to 0.0129 inch, avg.
Differential Scanning Calorimetry (DSC)(5) Melting Temperature Degree of Crystallinity	DIN EN ISO 11357-7 or ASTM D3418	Each Lot/Batch	343 Ñ 5°C (avg.) 23 to 33 % (avg.)

(1) Specific procedures should be identical to those used in the original material qualification program.
(2) Three specimens minimum should be taken across the width of the semipreg from each batch/lot.
(3) (w1-w2)/w1*100, where w1 equals to semi-preg areal weight (PAW) and w2 fiber areal weight without sizing (FAW).
(4) Semipreg matrix digestion via ASTM D3171 Procedure B.
(5) Limit calculated with 1% Ŭ, use caliper for thickness measurement.

& R Q V W L W X H Q W 0 D W H U L D O 5 H T X L U H P H Q W V

3.1.1 Reinforcement: The carbon fiber tow shall be qualified to NMS 818/22

/ D P L Q D W H & R Q V R O L G D W H G 7 H &K &K &K 5 H T X L U H P H Q W V

3.2.2 Consolidated Laminate Physical Properties:

TABLE 2 - Consolidated Laminate Physical Properties (Class 3)

Property	Test Method	Requirements[2]
Differential Scanning Calorimetry DSC[1] [4] Melting Temperature Degree of Crystallinity	DIN EN ISO 11357-7 or ASTM D3418	 343 Ñ 7 °C (avg.) 23 to 33 % (avg.)
Visual	NMS 401 Base Material Spec (Section 9.1)	100%[3]
NDI Health Control	(ASTM E1316, ASTM E2580 & NAS 410) or 39.P02.040.04	100%[3]
Consolidated Ply Thickness, CPT	ASTM D3171 or PCD SQ.405.004.12	0.0117 to 0.0129 inch, avg.
Laminate Density[4]	ASTM D792	1.52 to 1.56 g/cc, avg.
Fiber Volume, by Volume[4]	ASTM D3171	48.0 to 55.0 %, avg.
Resin Content, by Weight[4]	ASTM D3171	38.0 to 44.0 %, avg.
Void Content, by Volume[4]	ASTM D3171	Ò 2%, avg.

(1) φHf for 100% crystallized PEEK = 130J/g.
(2) ñavg.ò refers to the average measurements per panel. Required only on one of the panels listed in Table 3.
(3) 100% refers to surface area inspected. A minimum of 75% of the laminate shall be defect free.
(4) Limits calculated with 1% Ŭ.

3.2.3 Consolidated Laminate Mechanical Properties:

TABLE 3 - Required Consolidated Laminate Tests for Mechanical Properties
(Class 2 and Class 3)

Property	Test Method(1)	Requirements(4)
0Á (warp) Tension Strength and Modulus, Room Temperature		

4 8 $ / ,) , (' 3 5 2 ' 8 & 7 6 / , 6 7

Supplier Product Designation	Supplier Name and Production Location	Date Qualified	Specification Callout
Tenax Ê -E TPWF PEEK-4-40-HTA40 E13 3K DT-5HS-285 Semi-preg	Supplier Name: Teijin Carbon America, Inc. Teijin Carbon Europe GmbH	March 8, 2023	NMS 401/3, Type 42 Class 2, Grade 284
Tenax Ê -E TPCL PEEK-4-40-HTA40 E13 3K DT-5HS-285 Laminate	Production Location: Porcher Industries Chemin des Chaumes 38690 Le Grand-Lemps France	March 8, 2023	NMS 401/3, Type 42, Class 3, Grade 284

Class 2 Product Code:-

Name	TCA product code	TCE product code
Tenax™-E TPWF PEEK-4-40-	B30024	5209

Class 3 Product Code:-

d v Æ r dW >r,d ðì íï ï< ñ,^ ~•š l]vP •Y µ ov](]µ•š]}]vWE DW

E u d]i]v /vš Œv o > Çµ‰ dZ]lv •• E~]DW > Çµ‰ ~]v Z•

Class 3 Product Code (Continued):-

Other Teijin laminates product:- (not used in NCAMP Qualification)

E u ŒP c • 4 P ° S P C ˆ UÈ€E ` P •(QW˜Ó3…\• @ “~ $ C3 ©7øQ]” 7 0 0 €€€ õ 08 Õ € q•€ c Œ À } 31š C }

In accordance with NCAMP Standard Operating Procedures, NSP 100, this QPL shall not contain alternate materials/products. Additional production location may be included in the QPL only after successful equivalency demonstration and approval per NCAMP Prepreg Process Control Document (PCD) Preparation and Maintenance Guide, NRP 101.

The proper specification callout for material procurement purpose is ñNMS 401/3.ò This specification is developed based on the material properties that are available publicly. The purchaser may specify additional requirements beyond those specified in this specification, especially when the purchaser has generated additional material properties beyond those available publicly or when the application requires additional requirements. The additional requirements are subject to supplier review and approval.