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(54) Title: AUTOMOBILE CONNECTOR HOUSING

(57) Abstract: Provided is an automobile connector housing that can achieve downsizing and slimness, improve quality property, downsize a molding machine, and reduce a processing cost. The automobile connector housing is made of an unreinforced polyacetal having a shear strength of 55 MPa or more. A terminal retention force is preferably 65 N or more.



WO 2012/169191 A1

Description

Title of Invention: AUTOMOBILE CONNECTOR HOUSING

Technical Field

[0001] The present invention relates to an automobile connector housing capable of downsizing and slimness.

Background Art

[0002] In recent years, according to the trend toward downsizing of wire harness, the downsizing and slimness of a connector housing is strongly required.

In the case of polybutylene terephthalate (hereinafter referred to as PBT) as the main material of a connector housing, in order to meet the need of downsizing and slimness, a glass fiber (hereinafter referred to as GF) has been added to further improve the strength (for example, see PTLs 1 to 3). However, there has been the problem of significantly reducing the toughness and fluidity of a material by the addition of GF. Therefore, the above conventional material increases the molding cycle time of a connector housing, thus degrading productivity. In addition, when the molding temperature is increased in order to secure fluidity and melt viscosity, the degree of deterioration of the material is increased, and there is a possibility of adversely affecting characteristics such as durability. Also, when the fluidity of the material is low, a considerable injection pressure is required in injection molding and it is difficult to downsize a molding machine and reduce a processing cost.

Citation List

Patent Literature

- [0003] PTL 1: Japanese Patent Application Laid-Open (JP-A) No. 2009-155367
PTL 2: JP-A No. 5-170933
PTL 3: International Publication No. 2009/081571

Summary of Invention

Technical Problem

[0004] An object of the invention is to provide an automobile connector housing that can achieve downsizing and slimness, improve a quality property, downsize a molding machine, and reduce a processing cost.

Solution to Problem

- [0005] (1) An automobile connector housing made of an unreinforced polyacetal having a shear strength of 55 MPa or more.
- [0006] (2) The automobile connector housing described in the above (1), wherein a terminal retention force is 65 N or more.

Advantageous Effects of Invention

[0007] According to the invention, it is possible to provide an automobile connector housing that can achieve downsizing and slimness, improve a quality property, downsize a molding machine, and reduce a processing cost.

Description of Embodiments

[0008] An automobile connector housing according to the invention uses an unreinforced polyacetal having a shear strength of 55 MPa or more.

[0009] In the invention, a polyacetal is used to secure mechanical characteristics equal to or more than those of conventional materials, and reduce melt viscosity that was a problem in molding. Mechanical characteristics important in designing a connector housing are the stiffness and toughness functions of a housing lance itself and the terminal locking function of a lance peak section. As for the material, the former corresponds to a bending elastic modulus and a bending deflection, and the latter corresponds to a shear strength. In terms of the shear strength, while the PBT as a conventional material exhibits 48 to 51 MPa, the polyacetal exhibits 55 to 63 MPa, enabling designs so far and slimmer designs.

Also, the term "unreinforced" in the "unreinforced polyacetal" according to the invention means not being reinforced by inorganic fillers such as fiber, powder or scale-like fillers.

[0010] The automobile connector housing of the invention uses an unreinforced polyacetal having a shear strength of 55 MPa or more, but downsizing and slimness are difficult in the case where the shear strength is less than 55 MPa. The shear strength is preferably 55 to 63 MPa, and more preferably 60 to 63 MPa.

Herein, in the invention, a shear strength value is measured and obtained by a test method based on the ASTM D732 standard.

[0011] The automobile connector housing of the invention can provide a terminal retention force of 65 N or more because the shear strength is equal to or higher than 55 MPa as described above. Preferably, the terminal retention force may be 70 N or more.

Herein, in the invention, a terminal retention force value is measured and obtained as follows. That is, first, an electric wire having a compressed terminal suitable for an automobile connector housing to be measured is prepared, and the terminal of the electric wire is fitted to the automobile connector housing. Thereafter, in Autograph (AG-IS) manufactured by Shimadzu Corporation, the electric wire is fixed to one of a pair of chucks located up and down, the housing is fixed to the other, and a tensile test is performed. Then, a load at the time of the terminal of the electric wire being deviated from the housing is the terminal retention force.

[0012] Herein, in general, the polyacetal is a polymer corresponding to a unit structure

(monomer) of CH_2O (oxymethylene or formaldehyde), and there are two types: a mono-polymer for only formaldehyde and a copolymer $((\text{CH}_2\text{O})_n(\text{CH}_2\text{CH}_2\text{O})_m)$ to which oxyethylene $\text{CH}_2\text{CH}_2\text{O}$ is added in an amount of about 10 mol% as a monomer. In the invention, the shear strength may be any type within the above range.

[0013] The automobile connector housing of the invention may be molded by injection molding. Herein, as described above, since polyacetal is used as the material and it has a lower melt viscosity than the PBT, the injection pressure can be reduced by about 20% as compared to the case of using the PBT. Furthermore, the cycle time can be reduced, a molding machine of a special specification is not required, and it is possible to downsize the molding machine and reduce the processing cost.

[0014] Also, in the invention, when necessary, a variety of additives (except reinforced filler) may be added to the polyacetal used as the material.

Examples

[0015] Hereinafter, the invention will be described in detail with reference to Examples. However, the invention is not limited by the following Examples.

Example 1

[0016] DURACON M270-44 (unreinforced polyacetal) manufactured by Poly Plastics Co., Ltd. was used as a material, and an injection molding machine (50i 2000alpha, manufactured by FANUC Co., Ltd) was used to perform injection molding under the conditions of a cylinder temperature of 190 degree C and a molding temperature of 80 degree C, thereby molding a 12-pole non-waterproof mess-type connector housing with a tab width of 2.80 mm.

Comparative Example 1

[0017] Except for using 5101-H01 (unreinforced PBT) manufactured by Toray Co., Ltd. as a material, a connector housing was molded in the same manner as in Example 1.

Comparative Example 2

[0018] Except for using HF-HIS (CS7000NY) (unreinforced PBT) manufactured by Poly Plastics Co., Ltd. as a material, a connector housing was molded in the same manner as in Example 1.

[0019] <Evaluation>

The following evaluation test was performed on the connector housings molded in Example 1 and Comparative Examples 1 and 2.

[0020] (1) Bending Elastic Modulus

A bending elastic modulus was measured by a test method based on the ASTM D790 standard. A measurement result of 2500 MPa or more was evaluated as O, and a measurement result of less than 2500 MPa was evaluated as X. The evaluation results are listed in Table 1.

[0021] (2) Bending Fracture Deflection

A bending fracture deflection was measured by a test method based on the ASTM D790 standard. A measurement result of 3.4% or more was evaluated as O, and a measurement result of less than 3.4% was evaluated as X. The evaluation results are listed in Table 1.

[0022] (3) Shear Strength

A shear strength was measured by a test method based on the ASTM D732 standard. A measurement result of 55 MPa or more was evaluated as O, and a measurement result of less than 55 MPa was evaluated as X. The evaluation results are listed in Table 1.

[0023] (4) Terminal Retention Force

An electric wire having a compressed terminal suitable for the connector housing obtained in each of Example and Comparative Examples was prepared, and the terminal of the electric wire was fitted to the automobile connector housing. Thereafter, in Autograph (AG-IS) manufactured by Shimadzu Corporation, the electric wire was fixed to one of a pair of chucks located up and down, the housing was fixed to the other, and a tensile test was performed. Then, a load at the time of the terminal of the electric wire being deviated from the housing was the terminal retention force. A measurement result of 65 N or more was evaluated as O, and a measurement result of less than 65 N was evaluated as X. The evaluation results are listed in Table 1.

[0024] [Table 1]

		Example 1	Comparative Example 1	Comparative Example 2
Material Property	Bending Elastic Modulus [MPa]	2.684	2.373	2.685
	Shear Strength [MPa]	62.5	48.3	54.4
Product Property	Terminal Retention force	○	×	×

[0025] As can be seen from Table 1, Example 1 was good in all of the evaluation results, whereas Comparative Examples 1 and 2 were not good in all of the evaluation results simultaneously.

Claims

- [Claim 1] An automobile connector housing made of an unreinforced polyacetal having a shear strength of 55 MPa or more.
- [Claim 2] The automobile connector housing according to claim 1, wherein a terminal retention force is 65 N or more.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R13/405
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Wikipedia Contributors: "Polyoxymethylene", 28 May 2011 (2011-05-28), pages 1-4, XP55038697, Retrieved from the Internet: URL: http://en.wikipedia.org/w/index.php?title=Polyoxymethylene&oldid=431356461 [retrieved on 2012-09-20] the whole document -----	1,2



Further documents are listed in the continuation of Box C.



See patent family annex.

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