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شرکت ملی گازایران

مدیریت پژوهش وفناوری

امورتدوین استانداردها

IGS

Iranian Gas Standards

مشخصات فنی خرید

گریس آب بندی برای شیرهای سماوری وتوپکی

Sealant for Ball and Plug Valves Used in Natural Gas System

.

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شرکت ملی گاز ایران

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ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری و رئیس شورای استاندارد

باسلام،

به استحضار می رساند در جلسه ۱۴۳٤ مورخ ۱۹/ ۱۰/ ۱۳۸۹ هیأت مدیره، نامه شماره گ۹/۱۳٤٥٥۱/۰۰۰ مورخ ۸۹/۱۰/۶ آن مدیریت درمورد تصویب نهایی استانداردها تحت عناوین ذیل مطرح و مورد تصویب قرار گرفت:

۱- دستورالعمل جوشکاری و آزمون غیر مخرب استحکام و عدم نشتی سه راهی انشعاب پلی اتیلن — IGS-C-DN-04(0)

۲- مشخصات استاندارد ساده دی اتیلن گلایکول برای نم زدایی از گاز طبیعی — IGS-M-CH-022(1)

۳- مشخصات فنی خرید گریس آب بندی برای شیرهای سمساری و توپکی — IGS-M-CH-037(0)

ناصر آبگون

دبیر هیأت مدیره

رونوشت: مدیرعامل محترم شرکت ملی گاز ایران و قائم مقام رئیس هیأت مدیره
: معاون محترم مدیرعامل
: اعضای محترم هیأت مدیره
: مشاور محترم مدیرعامل
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: رئیس محترم امور حقوقی
: رئیس محترم امور مجامع

FOREWORD

This standard specification is intended to be mainly used by NIGC and contractors and has been prepared on interpretation of recognized standards , technical documents , knowledge , backgrounds and experiences in gas industries at national and international levels .

Iranian Gas Standards (IGS) are prepared , reviewed and amended by technical standard committees within NIGC Standardization Div. and submitted to the NIGC's “STANDARDS COUNCIL“ for approval .

IGS standards are subject to revision , amendment or withdrawal , if required , thus the latest edition of IGS shall be checked/inquired by NIGC users .

This standard must not be modified or altered by the end users within NIGC and her contractors . Any deviation from normative references and/or well known manufacturers specifications must be reported to standardization division .

Any comments from concerned parties on NIGC distributed IGS are welcome to technical standards committees and will receive serious attention and consideration should a revision to standards is recommended .

GENERAL DEFINITIONS :

Throughout this standard the following definitions , where applicable , should be followed :

1- “**STANDARDIZATION DIV.**“ has been organized to deal with all aspects of industrial standards in NIGC . Therefore , all queries for clarification or amendments are requested to be directed to the mentioned division .

2- “**COMPANY**“ : refers to National Iranian Gas Company .

3- “**SUPLIER**“ : refers to a firm who will supply the service , equipment or material to IGS specification whether as the prime producer or manufacturer or a trading firm .

4-"**SHALL**" : is used where a provision is mandatory.

5-"**SHOULD**" : is used where a provision is advised only.

6-"**MAY**" : is used where a provision is completely discretionary.

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1. SCOPE

1.1 This standard specification covers the NIGC requirements for sealant which is used for sealing and/or lubricating of ball and plug valves concerning in natural gas distribution and transmission system, compressor station, that works at warm and cold climates.

Note : The operational temperature range in NIGC gas refineries is between -70 °C to 200 °C and in its gas transmission lines is within -40 °C to 90 °C.

1.2 The sealant may be furnished in the following types:

Type I : Bulk
Type II : Stick

2. NORMATIVE REFERENCES

Throughout this standard specification the following standards are referred to the editions of these standards that are in effect at the time of issue of this standard specification (2010) shall, to the extent specified herein, form part of this standard specification. The applicability of changes in standards that occur after the date of this standard specification shall be mutually agreed upon by the purchaser and the supplier.

ASTM D 1403 (2007) "Standard Test Method for Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment**"**

ASTM D 217 (2002) "Standard Test Method for Cone Penetration of Lubricating Grease**"**

ASTM D 2265 (2006) "Standard Test Method for Dropping Point of Lubricating Grease Over Wide Temperature Range**"**

ASTM D 566 (2002) "Standard Test Method for Dropping Point of Lubricating Grease**"**

ASTM D 4048 (2002) "Standard Test Method for Detection of Copper Corrosion from Lubricating Grease**"**

ASTM D 1264 (2008) "Standard Test Method for Determining the Water Washout Characteristics of Lubricating Greases**"**

ASTM D 1742 (2006) "Standard Test Method for Oil Separation from Lubricating Grease During Storage**"**

ASTM D 972 (2008) "Standard Test Method for Evaporation Loss of Lubricating Greases and Oils**"**

MIL G 6032 D (1988) "Plug Valve, Gasoline and Oil Resistant. NATO Code : G . 363 : 2002 : Grease, Plug Valve, Hydrocarbon Resistant**"**

Defence Standard 91-6 "Grease, Plug Valve, Hydrocarbon Resistant" , NATO Code G-363 , Joint Service Designation XG-235, August 2002**"**

3. REQUIREMENTS

3.1 Materials

The sealant shall be a mixture consisting of animal, vegetable or synthetic oil, or a combination thereof, and a suitable viscosifier and or gelling agent (such as organoclay or organophilic clay). The sealant shall contain no solid fillers such as graphite, mica, sulfur, clay, asbestos or chalk.
The sealant when examined visually shall appear homogeneous, free of lumps, crust and separated oil.

Note : Synthetic base oil of sealants must be approved by FT-IR spectroscopy.

3.2 Physical Properties

Physical properties of the sealant shall be in accordance with table 1 (for warm climate) and table 2 (for cold climate), when tested in accordance with specified test methods.

3.3 Performance Test

The sealant performance shall be approved with cycling test. This type test shall be carried out in accordance with Appendix 1 IGS-M-PL-002(2) Part 1: 2002 by an recognized authorized certifying body and manufacturer shall submit this cycling test certificate.

Note : Appendix 1 IGS-M-PL-002 Part 1 : 2002 is submitted in Appendix F this standard specification.

As long as the properties and manufacture of sealant have not been changed, the issued certificate is valid.
The selected test valve shall meet all requirements of IGS-M-PL-002 (0) Part 1.
The test procedure shall be as Appendix 1 above mentioned IGS and required number of cycle shall be 3000.
The size of selected test valve shall be in accordance with clause 2 of IGS-M-PL-002 (0) Part 1.
At the end of the test, valve shall be tested as per IGS standard and no leaking is allowed.

3.4 Corrosivity Test

Corrosivity of the sealant shall be approved by one of the following tests:

1- RIPI. TEST METHOD (APPENDIX E)
2- DEF STAN 91-6/4 (APPENDIX C)

TABLE 1 – Sealant Specifications for Ball and Plug Valves Used in Natural Gas Network pipeline (Warm Climate)

Item	Property	Value				Unit	Test Method	Type of Test
		Bulk		Stick				
1	Appearance	Homogeneous and free from impurities.				---	Visual examination	Routine
2	Consistency (equivalent NLGI grade)	3	4	5	6	NLGI Grade	---	---
3	Cone Penetration at 25 °C					0.1 mm	ASTM D 217 or ASTM D 1403	Routine
	Unworked, min	220	170	130	80			
	Worked, max	260	200	160	115			
4	Dropping Point, min	220		260		°C	ASTM D 566 or ASTM D 2265	Routine
5	Copper Corrosion at 100 °C, 24 hrs					---	ASTM D 4048	Routine
	Condition of copper strip	No pitting, etching or dark brown, green, black or grey staining (classification 1a maximum) .						
	Condition of sample	No change in texture and no green, grey or black coloration. Slight discoloration is permissible.						
6	Water Washout Characteristics at 79 °C, 2 hrs. max	4		4		mass%	ASTM D 1264	Type
7	Oil Separation at 100 °C, in 30 hrs, max	3		2		mass%	ASTM D 1742	Type
8	Evaporation Loss at 100°C, after 22 hrs, max	1		1		mass%	ASTM D 972	Type
9	The Resistance of Grease to Fuel•						DEF STAN 91-6/4 ANNEX A	Routine
	Solubility, max	30		25		mass%		
	Deterioration of the sample at 23 ± 2°C					---		
	After 7 ± 0.5 hrs immersion in test fluid	No swelling, blistering, cracking, loss of adhesion or other deterioration.						
	After 24 hrs air drying	No swelling, blistering, cracking, loss of adhesion or other deterioration.						
10	The Resistance of Grease to Water at 23 ± 2 °C for 168 ± 2 hrs					---	DEF STAN 91-6/4 ANNEX B	Routine
	Disintegration of the sample	No disintegration of the sample.						
	Appearance of the water	No more than slight turbidity of the liquids.						

11	The Resistance of Grease to Aqueous Alcohol•• at 23 ± 2 °C for 168 ± 2 hrs Disintegration of the sample Appearance of the aqueous alcohol	 No disintegration of the sample. No more than slight turbidity of the liquids.	---	DEF STAN 91-6/4 ANNEX B	Routine
12	Film Stability and Corrosivity of Steel Test Panels at Elevated Temperatures at100 ± 1 °C for 168 ± 2 hrs Changes observed in the sample Corrosion observed in the steel test panels	 No hardening, cracking or separation of the sample .Slight discoloration is permissible. No corrosion or resinous deposit on the steel panel.	---	DEF STAN 91-6/4 ANNEX C	Routine
13	Storage Stability	No separation of oil, formation of granular particles or any non homogeneity in the container.	---	Note 1	Routine
14	Grease Stability and Corrosivity of Steel, Aluminum, Grey Cast Iron and Brass••• at 60 °C, 40 bar, for 168 hrs Changes observed in the sample Corrosion observed in the strips test panels	 No hardening, cracking or separation of the sample .Slight discoloration is permissible. No corrosion or resinous deposit on the strips panels.	---	RIPI Method	Type

●Test fluid, of the following composition by volume at 20±5 ^{o}C:

I. 60% 2,2,4 . Trimethylpentane, laboratory reagent grade.
II. 25% Toluene, laboratory reagent grade.
III. 15% Xylene , laboratory reagent grade.

●●Aqueous alcohol; a 50/50 v/v mixture of distilled water and industrial methylated spirits, to BS 3591, grade 68.

●●● See "APPENDIX E" , E.3 Apparatus.

Note 1: A 0.5 kg (one. pound) can of sealant, with the lid tightly sealed on, shall be stored for 120 days at 54 ± 5 ^{o}C.

Note 2: For type test, a certificate shall be submitted from an independent laboratory. Each certificate is credible for maximum two years.

Note 3: The independent laboratory shall be approved by NIGC.

Note 4: The routine test shall be carried out respectively
If the result of each of these tests is failed the following tests are canceled and the sealant is rejected.

TABLE 2 – Sealant Specifications for Ball and Plug Valves Used in Natural Gas Network pipeline (Cold Climate)

Item	Property	Value					Unit	Test Method	Type of Test
		Bulk				Stick			
1	Appearance	Homogeneous and free from impurities.					---	Visual examination	Routine
2	Consistency (equivalent NLGI grade)	2	3	4	5	6	NLGI Grade	---	---
3	Cone Penetration at 25 °C						0.1mm	ASTM D 217 or ASTM D 1403	Routine
	Unworked, min	265	220	170	130	80			
	Worked, max	295	260	200	160	115			
4	Dropping Point, min	180			220		°C	ASTM D 566 or ASTM D 2265	Routine
5	Copper Corrosion at 100 °C, 24 hrs						---	ASTM D 4048	Routine
	Condition of copper strip	No pitting, etching or dark brown, green, black or grey staining (classification 1a maximum) .							
	Condition of sample	No change in texture and no green, grey or black coloration. Slight discoloration is permissible.							
6	Water Washout Characteristics at 79 °C, 2 hrs. max	4			4		mass%	ASTM D 1264	Type
7	Oil Separation at 100 °C, in 30 hrs, max	4			2		mass%	ASTM D 1742	Type
8	Evaporation Loss at 100°C, after 22 hrs, max	1.5			1		mass%	ASTM D 972	Type
9	The Resistance of Grease to Fuel•							DEF STAN 91-6/4 ANNEX A	Routine
	Solubility, max	40			25		mass%		
	Deterioration of the sample at 23 ± 2°C						---		
	After 7 ± 0.5 hrs immersion in test fluid	No swelling, blistering, cracking, loss of adhesion or other deterioration.							
	After 24 hrs air drying	No swelling, blistering, cracking, loss of adhesion or other deterioration.							
10	The Resistance of Grease to Water at 23 ± 2 °C for 168 ± 2 hrs						---	DEF STAN 91-6/4 ANNEX B	Routine
	Disintegration of the sample	No disintegration of the sample.							
	Appearance of the water	No more than slight turbidity of the liquids.							

11	The Resistance of Grease to Aqueous Alcohol•• at 23 ± 2 °C for 168 ± 2 hrs Disintegration of the sample Appearance of the aqueous alcohol	 No disintegration of the sample. No more than slight turbidity of the liquids.	---	DEF STAN 91-6/4 ANNEX B	Routine
12	Film Stability and Corrosivity of Steel Test Panels at Elevated Temperatures at 100 ± 1 °C for 168 ± 2 hrs Changes observed in the sample Corrosion observed in the steel test panels	 No hardening, cracking or separation of the sample .Slight discoloration is permissible. No corrosion or resinous deposit on the steel panel.	---	DEF STAN 91-6/4 ANNEX C	Routine
13	Storage Stability	No separation of oil, formation of granular particles or any non homogeneity in the container.	---	NOTE 1	Routine
14	Grease Stability and Corrosivity of Steel, Aluminum, Grey Cast Iron and Brass••• at 60 °C, 40 bar, for 168 hrs Changes observed in the sample Corrosion observed in the strips test panels	 No hardening, cracking or separation of the sample .Slight discoloration is permissible. No corrosion or resinous deposit on the strips panels.	---	RIPI Method	Type

●Test fluid, of the following composition by volume at 20±5 ^{o}C:

I. 60% 2,2,4 . Trimethylpentane, laboratory reagent grade.
II. 25% Toluene, laboratory reagent grade.
III. 15% Xylene , laboratory reagent grade.

●●Aqueous alcohol; a 50/50 v/v mixture of distilled water and industrial methylated spirits, to BS 3591, grade 68.

●●● See "APPENDIX E" , E.3 Apparatus.

Note 1: A 0.5 kg (one. pound) can of sealant, with the lid tightly sealed on, shall be stored for 120 days at 54 ± 5 ^{o}C.

Note 2: For type test, a certificate shall be submitted from an independent laboratory. Each certificate is credible for maximum two years.

Note 3: The independent laboratory shall be approved by NIGC.

Note 4: The routine test shall be carried out respectively
If the result of each of these tests is failed the following tests are canceled and the sealant is rejected.

4. INSPECTION

4.1 The manufacturer set up and maintain such quality and inspection system to ensure the products comply with all aspects of the requirements of this standard specification.

4.2 The manufacturer shall be responsible for carrying out all the tests and quality assurances required by this standard specification and shall maintain complete records of all such tests and qualifications. Such records shall be available for review by the purchaser or its nominated inspector. These documents and test results shall be traceable with regard to the batch number.

4.3 The supplier shall furnish to the purchaser a certificate of quality stating that each batch has been sampled, tested, and qualified in accordance with this standard specification and has been found to meet the requirements specified.

4.4 The purchaser or its nominated inspector reserves the right to inspect a part or whole of the products during manufacturing and prior to packing and could witness any inspections and tests in accordance with this standard specification.

4.5 Purchaser's inspector reserves the right to have access to the products at any time during manufacturing.

4.6 The manufacturer shall provide all facilities necessary for carrying out all inspections and tests as required by this standard specification.

4.7 Random sampling proportional to the quantity of each batch and frequency of inspections and tests as required by this standard specification shall be at the discretion of the inspector.

4.8 If a sample rejected in any inspection or test, re-sample shall be carried out, in case of any rejection in new samples, all products represented by such sampling shall be rejected.

4.9 Inspection or tests that carried out by the purchaser's inspector, in no way relieves the manufacturer/supplier of his responsibilities and liabilities under the conditions, terms and inspection of this standard specification.

5. PACKING

5.1 The sealant shall be supplied in sound, clean and dry containers suitable for the products.

5.2 The sealant shall be suitably packed in approved containers in accordance with the requirement of the contractor or order.

Note : Classification for net weight for bulk type and gun pack and size and number of sticks for stick type provide in Appendix D.

5.3 The containers shall be protected against all damages or defects which may occur during handling and seaworthy shipment.

6. MARKING

6.1 Marking of Containers

Each container shall be legibly marked at least with the following information:

- Name and trade mark of the manufacturer
- Product designation (type and trade name)
- IGS No.
- Net weight (for bulk type)
- Size and number of sticks (for stick type)
- Handling
- Storing
- Date of manufacture
- Date of expiry
- Order No.
- Batch No.
- Manufacturer's address

6.2 Instruction

Supplier shall provide complete sets of instruction for use.

7. STORAGE LIFE

The sealant shall meet the requirement of clause 3 after storage for 24 months of delivery date, in a tightly covered container at temperature between -10 to +35 ^{o}C.

" APPENDIX A "

METHOD FOR THE DETERMINATION OF THE RESISTANCE OF GREASE TO FUEL

A.1 Scope

This method describes the determination of the resistance of grease to the solvent action of a standard test fluid, representing hydrocarbon fuel.

A.2 Outline of Method

The sample is immersed and dispersed in a standard test fluid for a specified period of time. The solubility of the material in the fuel is determined and the physical effects of the immersion are observed.

A.3 Apparatus

A.3.1 Centrifuge, capable of operating at (100±10) rcf / min .
A.3.2 Mechanical shaker .
A.3.3 Bottle , clear glass , wide mouth , 250 cm^3, fitted with a ground glass stopper.
A.3.4 Centrifuge tube, glass, 100 cm^3, with stopper.
A.3.5 Pipette , 50 cm^3 .
A.3.6 Evaporating basin , 100 cm^3 .
A.3.7 Steam bath .
A.3.8 Oven, air circulating and capable of being controlled at (100±1)°C .
A.3.9 Test tube, glass, 100 mm long 15 mm internal diameter , and cork stopper.
A.3.10 Tongs.
A.3.11 Desiccator without desiccant.
A.3.12 Aluminum alloy strip to BS EN 2395, approximate dimensions 50 mm *10 mm *0.3 mm .

A.4 Materials

Test fluid, of the following composition by volume at (20±5) °C:

A.4.1 60% 2,2,4 . Trimethylpentane, laboratory reagent grade.
A.4.2 25% Toluene, laboratory reagent grade.
A.4.3 15% Xylene , laboratory reagent grade.

A.5 Preparation of Apparatus

Control oven at (100±1)°C.

A.6 Procedure

A.6.1 Determine the solubility of the sample in the test fluid as follows:

A.6.1.1 Into a tared glass bottle weigh approximately 2 g of the sample. Spread the sample in a thin film on the inside of the bottle and determine the sample weight to the nearest mg.
A.6.1.2 Add 100 cm^3 of the test fluid to the bottle and insert the stopper.
A.6.1.3 Place the bottle in the mechanical shaker and shake for 5 minutes.

A.6.1.4 Remove the bottle from the shaker and open carefully, decant the dispersion into the centrifuge tube and insert the stopper.
A.6.1.5 Centrifuge at 100 rcf until the test fluid and sample are separated and the supernatant fluid is clear.
A.6.1.6 Dry the evaporating basin in the oven at (100 ±1) °C for 30 minutes. Cool in the desiccator and weigh to the nearest 0.2 mg.
A.6.1.7 Pipette 50 cm^3 of the supernatant fluid into the evaporating basin.
A.6.1.8 Evaporate the contents of the basin to dryness on the steam bath.
A.6.1.9 Dry the evaporating basin in the oven at (100 ±1) °C for 30 minutes.
A.6.1.10 Remove the basin from the oven and allow to cool in the desiccator, then reweigh to the nearest 0.2 mg.
A.6.1.11 Calculate the mass of the residue in the basin to the nearest mg as in A.7.

A.6.2 Determine the resistance of the sample to the test fluid as follows:

A.6.2.1 Fill the test tube to a depth of 25 mm with the test fluid.
A.6.2.2 Clean the aluminum alloy strip with the test fluid and air dry. Spread an even coating of the sample, approximately 1 mm thick, on both sides of the strip. Place the prepared strip in the test tube containing the test fluid and insert the stopper, maintain the tube in a vertical position , for (7 ±0.5) hours at (23 ±2) °C.
A.6.2.3 Remove the strip from the test fluid, taking care not to disturb the coating of the sample on the strip.
A.6.2.4 Wet the strip by dipping at once in fresh test fluid, and while still wet, visually examine the sample for any evidence of swelling, blistering,
cracking, loss of adhesion or other deterioration.
A.6.2.5 Allow the strip to dry by supporting it vertically in a clean dry test tube for 24 hours at (23 ±2) °C and re-examine the sample for visible evidence of deterioration.

A.7. Calculation
Calculate the solubility of the sample in the test fluid to the nearest 0.5 percent from the masses recorded in B.6.1.1 to B.6.1.11 using the formula below:

Solubility , per cent by mass = 200 A/B
Where:

A= Mass of residue , in grams.
B= Mass of sample , in grams.

A.8. Reporting

A.8.1 Report the solubility of the sample in the fluid, to the nearest 0.5 percent by mass.
A.8.2 Report the presence or absence of swelling, blistering, cracking, loss of adhesion or other deterioration of the sample:

A.8.2.1 After immersion in the test fluid.
A.8.2.2 After 24 hours air drying, following the immersion.

A.9 Precision
Under review.

" APPENDIX B "

METHOD FOR THE DETERMINATION OF THE RESISTANCE OF GREASE TO WATER AND AQUEOUS ALCOHOL

B.1 Scope
The method describes determining the resistance of grease to the solvent action of water and aqueous alcohol.

B.2 Outline of Method
Two samples are immersed, one in water and one in aqueous alcohol, at (23 ±2) °C for (168±2) hours, and the clarity of the test fluid is assessed.

B.3 Apparatus
Bottles (x2), clear glass, 250 cm^3 fitted with ground glass stoppers.

B.4 Materials

B.4.1 Distilled water to ISO 3696.
B.4.2 Aqueous alcohol; a 50/50 v/v mixture of distilled water and industrial methylated spirits, to BS 3591, grade 68.

B.5 Preparation of Apparatus
Not Required.

B.6 Procedure

B.6.1 Place 200 cm^3 of the water in one of the bottles and 200 cm^3 of the aqueous alcohol in the other.
B.6.2 Introduce a single lump of the sample weighing 2 g to 3.0 g into the fluid in each bottle. Stopper the bottles and maintain at (23 ±2) °C for (168±2) hours.
B.6.3 At the end of the test period, invert each bottle twice and immediately visually examine each sample lump for evidence of disintegration.
B.6.4 Visually assess the clarity of test fluid 'clear', 'slightly turbid' or 'clouded'.

Note : Slight turbidity of the fluid is permissible.

B.7 Calculation
Not required.

B.8 Reporting

B.8.1 Report any disintegration of the sample in the water.
B.8.2 Report any disintegration of the sample in the aqueous alcohol.
B.8.3 Report the appearance of the test fluid.

B.9 Precision
Not applicable.

" APPENDIX C "

METHOD FOR THE DETERMINATION OF THE STABILITY AND CORROSIVITY OF GREASE AT ELEVATED TEMPERATURES

C.1 Scope

The method describes determination of the stability and corrosivity of grease at elevated temperatures.

C.2 Outline of Method

The sample is pressed between two steel plates to form a thin film and the assembly is maintained at 100°C for 168 hours . The sample is then visually examined for any sign of change and the steel plates for the evidence of corrosion.

C.3 Apparatus

C.3.1 Steel panels, 100 mm*50 mm, prepared form 1.2 mm sheet, to BS 1449, Part 1, grade and finished CR1FF. The panels shall be free from surface imperfections such as rolling marks, scores, etc.
C.3.2 Aluminium alloy strips to BS EN 2395, 50 mm*25mm *0.3 mm.
C.3.3 Tongs.
C.3.4 Spatula.
C.3.5 Oven, air circulating and capable of being controlled at (100 ±1) °C.
C.3.6 Clamp.
C.3.7 Desiccator, without desiccant.

C.4 Materials

C.4.1 Petroleum spirit 60/80, Laboratory reagent grade.
C.4.2 Cotton cambric.

C.5 Preparation of Apparatus

C.5.1 Prepare two of the steel test panels as described in Def Stan 05-50: Part 25.
C.5.2 Degrease two of the aluminum alloy strips by swabbing with fresh pieces of cotton cambric soaked in the petroleum spirit and air dry.

Note : After preparation, the panels and strips shall be handled only with the tongs. Prepared panels and strips may be stored for up to 24 hours in the dessicator.

C.5.3 Control the oven at (100 ±1) °C.

C.6 Procedure

C.6.1 Place an aluminum strip at each end of one of the steel panels to provide a test area approximately 50 mm* 50 mm.
C.6.2 Place approximately 2 g of the sample in the centre of the steel test panel. Place the other steel panel on top. Press together and clamp to form the test assembly.

C.6.3 Place the test assembly, horizontally in the oven, at (100 ±1) °C for(168 ±2)hours.
C.6.4 Using the tongs, remove the test assembly from the oven and allow to cool to (23 ±2)°C. Separate the component parts of the assembly.
C.6.5 Examine the sample for evidence of hardening, separation of components or other changes; ignore any changes in color.
C.6.6 Using the spatula, carefully remove the sample from the steel panels. Visually examine the areas of the panels that were in contact with the sample for evidence of corrosion.

C.7 Calculation
Not required.

C.8 Reporting

C.8.1 Report for the sample, the absence of presence of hardening, separation or other changes observed.
C.8.2 Report for the steel test panels, the absence or presence of any corrosion observed.

C.9 Precision
Not applicable.

" APPENDIX D "

CLASSIFICATION OF PACKAGING (INFORMATIVE)

D.1 Classification

The sealant may be furnished in the following types and classes as specified by end user.

D.1.1 Types

I. Bulk in the types of containers as follows:

TABLE D1 – Type of Container

Type of Container	Net Weight , lbs(~kg)
Can	10(4.5)
Pail	20(9) , 40(18) , 100(45)
Drum	120(54) , 400(180) , 440(198)

II. Stick in the form of cylindrical sticks of the size (table D2).

TABLE D2 – Stick in the form of cylindrical sticks of the size

Class	Diameter mm (inches)	Length mm (inches)	Sticks per box	Boxes per carton
A	6.35 (1/4)	22.23(7/8)	24	30
B	10.32 (13/32)	34.93 (1-3/8)	24	150
C	13.89(35/64)	50.80 (2)	24	120
D	16.67(21/32)	73.02 (2-7/16)	24	80
G	21.83(55/64)	85.73 (3 -3/8)	24	24
J	37.31(1-15/32)	104.78 (8-3/4)	6	10
K	38.89 (1-17/32)	254.00 (10)	6	10

TABLE D3 – Dimensional tolerances (Type II only)

Class	Tolerances , mm (inches)	
	Diameter	Length
A	±0.8(1/32)	±3.2 (1/8)
B	±1.6(1/16)	±3.2 (1/8)
C	±1.6(1/16)	±4.8(3/16)
D	±1.6(1/16)	±4.8(3/16)
G	±1.6(1/16)	±4.8(3/16)
J	±1.6(1/16)	±4.8(3/16)
K	±1.6(1/16)	±4.8(3/16)

III. Gun pack, a sealed soft plastic pouch, net weight 250 g.

Note : Gun pack sealant specifications shall be according to NLGI grade 2 of bulk type mentioned in table 2.

" APPENDIX E "

METHOD FOR THE DETERMINATION OF THE STABILITY AND CORROSIVITY OF GREASE AT CONTACT WITH NATURAL GAS

E.1 Scope

The method describes determination of the stability and corrosivity of grease at contact with natural gas (at elevated pressure and temperatures).

E.2 Outline of Method

The sample is pressed between two the steel and aluminum plates to form a thin film and the assembly is maintained at 60 ^{o}C, 40 bar for 168 hours at natural gas corrosion bomb. The sample is then visually examined for any sign of change and the steel and aluminum plates for the evidence of corrosion.

E.3 Apparatus

E.3.1 Steel strips, 50 mm*25 mm, prepared form 0.2 mm sheet, to BS 1449, Part 1, grade and finished CR1FF. The panels shall be free from surface imperfections such as rolling marks, scores, etc.
E.3.2 Aluminum alloy strips to BS EN 2395, 25 mm*50mm *0.3 mm.
E.3.3 Grey cast iron strips, approximately 48" x 25.5" x 13.1875". Material is grey cast iron ASTM A-48, class 20 or 25 iron.
E.3.4 Brass strips, 50 mm* 25 mm, also known as 70/30 brass, CDA260, CZ106, ISO CuZn30, UNS C26000.
E.3.5 Corrosion Bomb.
E.3.6 Oven or bath, capable of being controlled at (60±1) ^{0}C .
E.3.7 Gas charging equipment.

E.4 Materials

E.4.1 Natural gas cylinder with minimum pressure of 100 bar.
E.4.2 Cotton cambric.

E.5 Preparation of Apparatus

E.5.1 Prepare steel test strip as described in Def Stan 05-50: Part 25.
E.5.2 Degrease aluminum alloy strip by swabbing with fresh pieces of cotton cambric soaked in the petroleum spirit and air dry.
E.5.3 Control the oven or bath at (60 ±1) ^{o}C.

E.6 Procedure

E.6.1 Place approximately 5 g of the sample in the centre of the steel test strip. Place the aluminum alloy strip on top. Press and fixed together with Teflon clamp to form the test assembly.
E.6.2 Place the sample and strips (test assembly) in the corrosion bomb and pressurize it with natural gas at minimum 40 bar pressure.

E.6.3 Place the corrosion bomb in the oven or bath , at (60 ±1) ^{o}C for (168 ±2) hours. Corrosion bomb pressure must be set at 40 bar.
E.6.4 Remove the corrosion bomb from the oven or bath and allow to cool off (23 ±2) ^{o}C. Discharge the corrosion bomb from natural gas and separate the component parts of the test assembly.
E.6.5 Examine the sample for evidence of hardening, separation of components or other changes; ignore any changes in color.
E.6.6 Using the spatula, carefully remove the sample from the steel panels. Visually examine the areas of the panels that were in contact with the sample for evidence of corrosion.

E.7 Calculation
Not required.

E.8 Reporting
E.8.1 Report for the sample, the absence of presence of hardening, separation or other changes observed.
E.8.2 Report for the steel and aluminum test strips, the absence or presence of any corrosion observed.

E.9 Precision
Not applicable.

" APPENDIX F "

PERFORMANCE TEST BY CYCLING METHOD

This Annex provides Appendix 1 of IGS-M-PL-002-1(2) .

NIGC **Oct.2008** **IGS-M-PL-002-1(2)**

Appendix 1

PERFORMANCE TEST BY CYCLING METHOD:

Manufacturer shall submit the cycling test certificate from an independent and certifying body.
- Required number of cycle must be at least 10,000 times for valves from 2 to 24 Inch, concerning checking the integrity of plug external coating.
- Required number of cycle must be at least 3,000 times for valves from 2 to 24 Inch, concerning checking the leak performance after cycle test.

Test procedures shall be as follows:

1. Introduction:

performance test (type test), shall be carried out in accordance with this Annex by an authorized certifying body, as long as the design, manufacturing method and material have not been changed, the issued certificate is valid.

2. Selection of sizes for type testing:

2.1 For valves from 2 to 24 in., class 150, 300, 600, qualification of the range shall be as follows:
Half of the largest produced size in each class rating.

2.2 If the cycle test has been carried out on a valve with higher class rating, the other lower class rating at the same size range of same manufacturer is acceptable.

2.3 Two samples shall be chosen, one for checking the integrity of plug external coating (regardless of type of coating after 10,000 cycles, and one for checking the leaking of the valve, after 3000 cycles).

2.4 The selected samples must meet all the requirements of IGS-M-PL-002(2), Part 1.

2.5 The chosen test valves port area shall be as per this IGS standard.

2.6 Selection of test samples shall be done by manufacturer.

3. Checking the integrity of plug external coating:

3.1 Prior to cycling test, all the requited tests as per IGS-M-PL-002(1), shall be carried out to make sure, the selected test valve meets all the requirements of IGS standard.
3.2 The selected valve shall be cycled for 10,000 times.

3.3 The plug shall be cycled in body taper seat in original condition.

3.4 During the cycle test, after every 2000 cycles, the plug surface shall be examined to verify the integrity of anti-friction coating of the plug.

3.5 Acceptance criteria:
After 10,000 cycles, the plug surface shall be visually examined, which not more than 50% of plug anti-friction coating may de-scaled or worn.

3.6 Testing procedure for checking the integrity of plug external coating:

3.6.1 Every minute valve shall be opened and closed one time.

3.6.2 The cycling speed shall be specified by certifying body.

3.6.3 If cycle test is carried out at manufacturer's works, all machinery, instruments and programming of cycle test shall be evaluated approved and recorded by certifying body.

3.6.4 The authorized certifying body must make sure the selected sample by the manufacturer is produced in his own facility.

3.6.5 The sample shall be tested in ambient condition and within 20-30 ^{0}C temperature.

4. Checking the leaking phenomena after cycle test:

4.1 Prior to cycling test, all required tests as per IGS-M-PL-002(1) before external coating of the valve body, shall be carried out and make sure, the selected valve for cycling test meets all requirements of IGS standard.

4.2 The selected valve shall be cycled for 3000 times.

4.3 At the end of the test, valve shall be tested as per IGS standard and no leaking is allowed.

4.4 Testing procedure:

4.4.1 Every minute valve shall be opened and closed on time.

4.4.2 In every 100 cycles (opened and closed) valve shall be re-lubricated.
4.4.3 Make sure, there is not any leak at end of every 100 cycles, before re-lubricating the valve under test, the seat test (as per API 6 D) shall be carried out, no adjustment is permitted till end of 3000 cycles.

4.4.4 The cycling speed shall be specified by certifying body.

4.4.5 If cycle test is caring out at manufacturer's works, all machinery, instruments and programming of cycle test shall be evaluated, approved and programming of cycle test shall be evaluated, approved and recorded by certifying body.

4.4.6 The authorized certifying body must make sure the selected sample by the manufacture is produced in his own facility.
4.4.7 The sample shall be tested in ambient condition and within 20-30 ^{0}C temperature.

5. The attached data sheet shall be filled, signed and stamped by authorized certifying body and the manufacturer.

" APPENDIX G "

SEALANT TIPYCAL PROPERTIES (INFORMATIVE)

This Annex provides the physical characteristics for two types of sealants which are used in National Iranian Gas Company as follows:

SAV 733 valve sealant typical physical properties

Item	Property	Bulk	Stick
1	Color	Cream	Cream
2	Density (g/cm^3)	1.10	1.17
3	Penetration at 77 ^{0}F (25 ^{0}C), Unworked Worked	252 256	86 111
4	Equivalent NLGI grade	3	6
5	Dropping point ^{0}F ^{0}C	> 420 > 216	> 420 > 216
6	Flash point ^{0}F ^{0}C	520 271	320 160
7	Fire point ^{0}F ^{0}C	535 279	470 243
8	Recommended temperature range ^{0}F ^{0}C	-10 to 350 -23.5 to 177	10 to 350 -12.2 to 177

Nordstrom 555 valve sealant typical physical properties

Item	Property	Bulk	Stick
1	Color	Brown	Brown
2	Density (g/cm^3)	1.04	1.05
3	Penetration @ 77 ^{0}F (25 ^{0}C), Unworked Worked	257 258	104 171
4	Equivalent NLGI grade	4-5	2-3
5	Dropping point ^{0}F ^{0}C	397 203	> 430 > 221
6	Flash point ^{0}F ^{0}C	515 269	535 280
7	Fire point ^{0}F ^{0}C	560 294	550 288
8	Recommended temperature range ^{0}F ^{0}C	-20 to 500 -29 to 260	-10 to 500 -23 to 260