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Approved

مصوب



شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

مشخصات فنی خرید

مواد ضد خوردگی برای سیستم مدار بسته آب

Corrosion Inhibitor for Closed Water System

## **FOREWORD**

This standard 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 ammended 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 div.

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 div.

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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Website : <http://igs.nigc.ir>

E-mail : [nigcigs@nigc.org](mailto:nigcigs@nigc.org)

## پیشگفتار

- ۱- این استاندارد/دستورالعمل بمنظور استفاده اختصاصی در شرکت ملی گاز ایران و شرکتهای فرعی وابسته تهیه شده است.
- ۲- شرکت ملی گاز ایران در مورد نیازهای عمومی از استانداردهای وزارت نفت (IPS) و در مورد نیازهای اختصاصی از استانداردهای اختصاصی خود (IGS) استفاده می نماید.
- ۳- استانداردهای شرکت ملی گاز ایران (IGS) توسط کمیته های تخصصی استاندارد متشکل از کارشناسان بخش های مختلف و یا مشاور تهیه می شود و توسط شورای استاندارد (منتخب هیئت مدیره شرکت ملی گاز ایران) به تصویب میرسند.
- ۴- در تنظیم متن استانداردهای (IGS) از کلیه منابع شناخته شده استاندارد، اطلاعات فنی - تخصصی مربوط به صنایع گاز دنیا، مشخصات فنی تولیدات سازندگان معتبر جهانی و نیز از نتیجه تحقیقات و تجربیات کارشناسان و متخصصان داخلی بر حسب مورد استفاده می شود. همچنین بمنظور استفاده هر چه بیشتر از تولیدات داخلی قابلیت های سازندگان داخلی نیز مورد توجه قرار میگیرد.
- ۵- استانداردها از طریق پایگاه اینترنتی شرکت \* و یالوح فشرده (CD) در اختیار واحدها و کاربران قرار می گیرد .
- ۶- استانداردها بطور متوسط هر ۵ سال یکبار و یادر صورت ضرورت زودتر، مورد بازنگری و بروزرسانی قرار میگیرند. بنابراین کاربران باید همیشه آخرین نگارش را مورد استفاده قرار دهند.
- ۷- هرگونه نظر و یا پیشنهاد اصلاح در مورد استانداردها مورد استقبال و بررسی قرار خواهد گرفت و در صورت تأیید، استاندارد مربوطه نیز مورد تجدیدنظر قرار خواهد گرفت .

## تعاریف عمومی

در متن استانداردهای (IGS) از تعاریف و اصطلاحات زیر استفاده میشود.

- ۱- "شرکت" (COMPANY): منظور از شرکت "شرکت ملی گاز ایران" و یا شرکتهای فرعی وابسته میباشد.
- ۲- "فروشنده" (SUPPLIER/VENDOR): به فرد یا موسسه ای اطلاق میگردد که تعهدی را نسبت به شرکت تقبل نموده است.
- ۳- "خریدار" (PURCHASER): منظور از خریدار "شرکت ملی گاز ایران" و یا شرکتهای فرعی وابسته میباشد.
- ۴- "SHALL": در مواردی بکار برده میشود که انجام خواسته مورد نظر اجباری است
- ۵- "SHOULD": در مواردی بکار برده میشود که انجام خواسته مورد نظر ترجیحی و در عین حال اختیاری است
- ۶- "MAY": در مواردی بکار برده میشود که انجام کار به شکل مورد بحث نیز قابل قبول میباشد

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### 1. SCOPE

THIS STANDARD SPECIFICATION GIVES THE PROCEDURE FOR PURCHASING INHIBITOR(S) WHICH WILL BE USED IN THE CLOSED COOLING SYSTEM , CHILLED AND HOT WATER HEATING SYSTEM . INHIBITOR MUST BE NON-CHROMATE BASED AND ALSO COMPATIBLE WITH ETHYLENE GLYCOL .

## **2. REFERENCES**

THROUGHOUT THIS STANDARD SPECIFICATION THE FOLLOWING STANDARDS AND CODES ARE REFERRED TO . THE EDITIONS OF THESE STANDARDS AND CODES THAT ARE IN EFFECTED AT THE TIME OF ISSUES OF THIS STANDARD SPECIFICATION ( 1999 ) SHALL , TO THE EXTENT SPECIFIED HEREIN , FORM PART OF THIS STANDARD SPECIFICATION . THE APPLICABILITY OF CHANGES IN STANDARDS AND CODES THAT OCCUR AFTER THE DATE OF THIS STANDARD SPECIFICATION SHALL BE MUTUALLY AGREED UPON BY THE PURCHASER AND SUPPLIER AND/ OR MANUFACTURER .

ASTM ( AMERICAN SOCIETY FOR TESTING AND MATERIALS )

D 1384 – 80 “ METHOD FOR CORROSION TEST FOR ENGINE COOLANTS IN GLASSWARE “

D 1882 – 82 “ METHOD FOR EFFECT OF COOLING SYSTEM CHEMICAL SOLUTIONS ON ORGANIC FINISHES FOR AUTOMOTIVE VEHICLES “

US MILITARY STANDARDS

MIL – STD – 105 “ SAMPLING PROCEDURES AND TABLES FOR INSPECTION BY ATTRIBUTES “

## **2. INHIBITOR(S) CHARACTERISTICS**

THE SUPPLIER AND/OR MANUFACTURER SHALL PROPOSE THE INHIBITOR ( S ) TO BE ABLE TO PROVIDE MAXIMUM PROTECTION FOR ALL METALLS , FERROUS AND NON – FERROUS , IN CLOSED COOLING SYSTEMS , CHILLED WATER AND HOT WATER HEATING SYSTEMS .

RUBBER AND OTHER NON-METALLIC MATERIALS MUST NOT BE ADVERSELY AFFECTED BY THE INHIBITOR ( S ) ( SEE 3.4 ) . THE INHIBITOR ( S ) SHALL HAVE SUFFICIENT DETERGENT STRENGTH TO KEEP SYSTEM CLEAN AND FREE OF FOULING CORROSION PRODUCTS ( SEE 3.6 ) . THE PROPOSED INHIBITOR ( S ) SHALL MEET THE REQUIREMENTS SPECIFIED IN THIS PROCEDURE .

### **2.1 DEFINITIONS**

APPROVED PRODUCTS : THE APPROVED PRODUCTS ARE THOSE PRODUCTS WHOSE APPROVAL TEST SAMPLES ( SEE 4.1 ) HAVE BEEN

LABORATORY TESTED AND HAVE PASSED THE APPROVAL TESTS SPECIFIED HEREIN ( SEE 4 ) AND HAVE BEEN LISTED ON OR APPROVED FOR BEING LISTED AS APPROVED SAMPLES .

APPROVED SUPPLIERS : THE SUPPLIERS AND/OR MANUFACTURER OF APPROVED PRODUCTS WILL BE KNOWN AS APPROVED SUPPLIERS .

ACCEPTED PRODUCTS : THE ACCEPTED PRODUCTS ARE THOSE PRODUCTS WHICH HAVE PASSED THE APPROVAL TESTS AS WELL AS ACCEPTANCE OPERATIONAL TEST ( SEE 3.6 ) .

QUALIFIED PRODUCTS : THE QUALIFIED PRODUCTS MEAN THE ACCEPTED PRODUCTS PROPOSED WITH RESPECT TO THIS STANDARD SPECIFICATION WHICH MEET ALL REQUIREMENTS OF THIS STANDARD SPECIFICATION .

QUALIFIED SUPPLIER ( S ) : THE SUPPLIER AND/OR MANUFACTURER OF QUALIFIED PRODUCTS WILL BE KNOWN AS THE QUALIFIED SUPPLIER(S) .

FINAL SUPPLIER : THE SUCCESSFUL BIDDER IS KNOWN AS THE FINAL SUPPLIER .

**3.2 FORMULATION CHANGES**

THE PRESENTED MATERIAL ( S ) FOR SUPPLY SHALL BE ACCEPTED ONLY FOR THE FORMULATION FOR WHICH APPROVAL AND ACCEPTANCE OPERATIONAL TESTS ARE MADE ANY CHANGE ( S ) IN FORMULATION , SHALL CAUSE FOR DESIGNATING THE MATERIAL AS A NEW MATERIAL WHICH SHALL NOT BE CONSIDERED ACCEPTED . THE MANUFACTURER MAY SUBMIT THE MODIFIED MATERIAL FOR ACCEPTANCE UNDER THIS STANDARD SPECIFICATION , USING A NEW MANUFACTURER'S DESIGNATION .

**3.3 APPLICABILITY**

INHIBITOR (S) SHALL BE EASILY APPLICABLE WHEN USED FOR LOADING INTO THE COOLING / HEATING WATER SYSTEM WITHOUT ANY VIGOROUS OR IMPRACTICAL EFFORT .

3.4 CORROSION PERFORMANCE REQUIREMENTS THE CORROSION PERFORMANCE OF THE PROPOSED INHIBITOR (S) SHALL BE AS SPECIFIED IN TABLE BELLOW WHEN TESTED IN ACCORDANCE WITH ASTM D 1384 . THE PROPOSED INHIBITOR ( S ) SHALL PREVENT THE ADVERSE EFFECTS OF SYSTEM SOLUTIONS ON ORGANIC MATERIALS WHEN TESTED TO ASTM D 1882 .

TEST	WEIGHT LOSS , Mg/SPECIMEN , MAX.
( CORROSION IN GLASSWARE )	
COPPER	10
SOLDER	30
BRASS	10
STEEL	10
CAST IRON	10
ALUMINUM	30

**NOTES :**

- A/ ETHYLENE GLYCOL 99% SHALL BE USED INSTEAD OF ENGINE COOLANT WHEN PREPARING TEST SOLUTION ( SEE 7.1.1 OF ASTM D 1384 ) .
- B/ THE CONCENTRATION OF CORROSION INHIBITOR ( ANTIRUST ) SHALL BE THE MINIMUM CONCENTRATION ( DOSAGE ) AS SPECIFIED BY THE MANUFACTURER ( SEE 7.1.2 OF ASTM D 1384 )
- C/ THE TEST TEMPERATURE SHALL BE  $88 \pm 2^{\circ}\text{C}$  ( SEE 8.2 OF ASTM D 1384 )

**3.5 ECONOMICAL ASPECTS**

THE PROPOSED INHIBITOR (S) SHALL MEET THE REQUIREMENTS OF CLAUSE 3.1 AT THE LOWEST COST PER YEAR . THE COST EVALUATION WILL BE MADE BY THE PURCHASER ( TECHNICAL DEPARTMENT OF END USER IN THIS CASE ) , WITH REFERENCE TO THE PERFORMANCE OF THE PRODUCT (S) ( SEE 3.1 ) , INCLUDING COST OF PRODUCT (S) PER YEAR AND OTHER COSTS SUCH AS FORWARDING SHIPMENT , STORAGE , OPERATION AND ESTIMATED LOSS OF INHIBITOR (S) IN OPERATION AND SO ON .

**3.6 ACCEPTANCE OPERATIONAL TEST**

A 90 – DAY CONTINUOUS OPERATIONAL TEST WILL BE PERFORMED ON APPROVED PRODUCTS ( SEE 7 ) . THE PRODUCTS SHALL PASS THE OPERATIONAL TEST AT LOWEST INDIVIDUAL LOSS OF INHIBITOR ( S ) DURING OPERATION TO BE TAKEN AS AN ACCEPTED PRODUCTS .

**3.7 TECHNICAL SERVICES**

THE APPROVED SUPPLIER SHALL FURNISH FREE OF CHARGE ALL TECHNICAL SERVICES INCLUDING PERSONNEL , DOCUMENTATION , FINAL REPORTS AND TESTS INSTRUMENTATION IN ACCORDANCE WITH THE REQUIREMENTS OF THE ACCEPTANCE OPERATIONAL TEST . THE FINAL SUPPLIER SHALL SUPPLY FREE OF CHARGE AND IN TIME ALL NECESSARY TECHNICAL SERVICES DURING OPERATION .

**4. APPROVAL TESTS**

APPROVAL TESTS ARE THE LABORATORY TESTS PERFORMED ON THE SAMPLES SUBMITTED FOR APPROVAL . THE INHIBITOR ( S ) SHALL BE TESTED IN ACCORDANCE WITH APPROVAL TESTS PRESCRIBED IN THIS STANDARD SPECIFICATIONS ( SEE 3.4 ) AND SHALL PASS THESE TESTS .

**4.1 APPROVAL TEST SAMPLES**

4.1.1 APPROVAL TEST SAMPLE ( S ) SHALL CONSIST OF SUFFICIENT AMOUNT OF MATERIAL ( S ) PROPOSED AS THE INHIBITOR ( S ) FURNISHED UNDER THIS STANDARD SPECIFICATION . SAMPLE ( S ) SHALL BE FORWARDED TO THE PURCHASER . SAMPLE ( S ) SHALL BE PLAINLY IDENTIFIED BY SECURELY ATTACHED DURABLE TAGS OR LABELS MARKED WITH FOLLOWING INFORMATION :

SAMPLE FOR QUALIFICATION TESTS ( OR APPROVAL TESTS ) .

BRAND NAME

NAME OF PRODUCTION PLANT ( PLANT WHERE INHIBITOR IS MASS PRODUCED )

MATERIAL DESIGNATION ( PRODUCT REF/COD )

DATE OF PRODUCTION



**4.1.2 THE SUPPLIER AND/OR MANUFACTURER SHALL ALSO PROVIDE THE OPERATIONAL INFORMATION WITH EACH SAMPLE ( S ) AS FOLLOWS :**

**DESCRIPTION AND FUNCTION ( S )**

**ANALYTICAL CONTROL**

**OPERATIONAL INSTRUCTION**

**DOSAGE**

**HANDLING**

**STORAGING**

**SHELFLIFE**

**OTHERS**

**THE SUPPLIER SHALL SPECIFY PHYSICAL PROPERTIES FOR THE MATERIAL ( S ) COVERING THE FOLLOWINGS :**

**FORM**

**PH**

**COLOR**

**ODOUR**

**POUR POINT**

**FLASH POINT**

**VISCOSITY AT 20°C**

**SPECIFIC GRAVITY**

**DENSITY AT 20°C**

**SOLUBILITY IN WATER AT 20°C**

**OTHERS**

## **5. PRODUCTION TESTS**

**PRODUCTION TESTS ARE THE ONES NORMALLY PERFORMED BY THE PRODUCER ON SAMPLES TAKEN FROM PRODUCTION RUN DURING THE PRODUCTION OF INHIBITOR ( S ) ACCORDING TO ITS OWN QUALITY STANDARD . THE MANUFACTURER SHALL PROVIDE THE PRODUCTION TESTS REPORTS TO THE MENTIONED STANDARD .**

## **6. QUALITY ASSURANCE**

THE SUPPLIER SHALL PROVIDE A QUALITY ASSURANCE CERTIFICATE TO ENSURE THAT THE INHIBITOR (S) PROPOSED COMPLIES WITH THIS STANDARD SPECIFICATION .

## **7. ACCEPTANCE OPERATIONAL SAMPLES**

THE APPROVED SUPPLIERS WHOSE PROPOSED PRODUCTS MEET SUBCLAUSE 3.4 WILL BE REQUESTED TO SUPPLY SUFFICIENT AMOUNT OF APPROVED PRODUCT FOR A CONTINUOUS 90 DAY ACCEPTANCE OPERATIONAL TEST .

## **8. STORAGE LIFE AND PACKAGING**

### **8.1 STORAGE LIFE**

THE INHIBITOR ( S ) SHALL MEET ALL REQUIREMENTS OF THIS STANDARD SPECIFICATION AT LEAST 24 MONTHS FROM DATE OF DELIVERY .

### **8.2 PACKAGING**

THE MATERIAL ( S ) SHALL BE SUPPLIED IN 50 kg NEW STEEL DRUMS AND PROTECTED AGAINST ALL DAMAGES OR DEFECTS WHICH MAY OCCUR DURING HANDLING AND SEAWORTHY SHIPMENT .

### **8.3 COMPATIBILITY OF CONTAINER WITH INHIBITOR(S) MATERIAL**

THE CONTAINER MATERIAL ( NEW STEEL DRUM ) SHALL BE COMPATIBLE WITH INHIBITOR ( S ) TO THE EXTENT THAT IT SHALL NOT CAUSE DELAMINATION , SWELLING , EMBRITTLEMENT , DISSOLUTION , OR OTHER DETERIORATION SUCH AS TO CAUSING THE DEGRADATION OF THE CONTAINER MATERIAL .

## **9. INSPECTION AND QUALITY ASSURANCE ( QA )**

9.1 THE MANUFACTURER AND/OR SUPPLIER SHALL BE RESPONSIBLE FOR CARRYING OUT ALL THE TESTS AND QA'S REQUIRED BY THIS STANDARD SPECIFICATION ( SEE 3.4 ) , USING HIS OWN OR OTHER RELIABLE FACILITIES , AND HE SHALL MAINTAIN COMPLETE RECORDS OF ALL SUCH TESTS AND QUALIFICATIONS .

SUCH RECORDS SHALL BE AVAILABLE FOR REVIEW BY THE PURCHASER . THE MANUFACTURER AND/OR SUPPLIER SHALL FURNISH TO THE PURCHASER A CERTIFICATE OF QUALITY STATING THAT EACH LOT HAS BEEN SAMPLED , TESTED , AND QUALIFIED IN ACCORDANCE WITH THIS STANDARD SPECIFICATION AND HAS BEEN FOUND TO MEET THE REQUIREMENTS SPECIFIED .

9.2 AN INSPECTION LOT SHALL CONSIST OF A BATCH ( OR BATCHES ) OF PRODUCTION PROCESSED FROM THE SAME MATERIAL COMPONENTS , AND OFFERED FOR INSPECTION AT ONE TIME .

9.3 THE MANUFACTURER AND/OR SUPPLIER SHALL AFFORD THE PURCHASER'S INSPECTOR ALL REASONABLE FACILITIES REQUIRED FOR INSPECTION OF EACH BATCH OF PRODUCTION IN ACCORDANCE WITH THIS STANDARD SPECIFICATION . SUCH INSPECTION IN NO WAY RELIEVES THE MANUFACTURER AND/OR SUPPLIER OF HIS RESPONSIBILITIES UNDER THE TERM OF THIS STANDARD SPECIFICATION .

9.4 THE PURCHASER RESERVES THE RIGHT TO PERFORM ANY INSPECTIONS SET FORTH IN THIS STANDARD SPECIFICATION WHERE SUCH INSPECTIONS ARE DEEMED NECESSARY TO ASSURE THAT SUPPLIES AND SERVICES CONFORM TO THE PRESCRIBED REQUIREMENTS .

9.5 THE PURCHASER'S INSPECTOR RESERVE THE RIGHT TO HAVE ACCESS TO THE MATERIALS SUBJECT TO INSPECTION FOR THE PURPOSE OF WITNESSING SELECTION OF THE SAMPLES , PREPARATION OF THE TEST SAMPLES AND PERFORMANCE OF THE TEST ( S ) . FOR SUCH TESTS , THE INSPECTOR RESERVES THE RIGHT TO INDICATE THE SAMPLE ( S ) FROM WHICH THE QUANTITIES WILL BE TAKEN IN ACCORDANCE WITH THE PROVISIONS OF THIS STANDARD SPECIFICATION .

9.6 SAMPLING FOR VISUAL INSPECTION

THE RANDOM SAMPLE ( S ) OF FILLED CONTAINERS SHALL BE SELECTED FROM EACH INSPECTION LOT BY PURCHASER'S INSPECTOR IN ACCORDANCE WITH STANDARD MIL-STD – 105 AT INSPECTION LEVEL I AND ( AQL ) 2.5 PERCENT DEFECTIVE TO VERIFY CONFORMANCE TO ALL REQUIREMENTS OF THIS STANDARD SPECIFICATION REGARDING FILL , CLOSURE AND MARKING .

## **10. MARKING**

### **10.1 MARKING OF CONTAINERS**

EACH CONTAINER SHALL BE LEGIBLY MARKED AT LEAST WITH FOLLOWING INFORMATION :

MANUFACTURER'S NAME AND ADDRESS

PURCHASER'S NAME AND ADDRESS

STANDARD SPECIFICATION : ( IGS-MS-CH-030-1999 ) .

MESC NO.

HANDLING GUIDELINES

STORAGING SYMBOLS

DATE OF MANUFACTURE

BATCH NO.

### **10.2 INSTRUCTION**

SUPPLIER SHALL PROVIDE COMPLETE SETS OF INSTRUCTIONS FOR USE COVERING DOSAGE , LOCATION OF FEEDING , TYPE OF INJECTION SYSTEM AND ANALYTICAL CONTROL THOROUGHLY .

### **10.3 PRECAUTIONARY MARKING**

ALL INDIVIDUAL CONTAINERS SHALL BE MARKED WITH PRECAUTIONARY SYMBOLS OR PHRASES .