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उत्पाद मैन्युअल
कैप्रोलैक्टम – विशिष्टि IS 12210: 2023 के अनुसार

PRODUCT MANUAL
CAPROLACTAM - SPECIFICATION ACCORDING TO IS 12210: 2023

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, **2018** की योजना के तहत प्रमारण के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैन्युअल का उपयोग सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। इस दस्तावेज़ के उपयोग बीआईएस प्रमारण प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	**Product**	:	IS 12210: 2023
	Title	.	**Caprolactam - Specification**
	No. of Amendments	:	Nil
2.	**Sampling Guidelines:**		
a)	**Raw material**	:	No specific requirement
b)	**Grouping guidelines**	:	Nil
c)	**Sample Size**	:	1 kg for complete testing
3.	**List of Test Equipment**	:	Please refer **ANNEX – A.**
4.	**Scheme of Inspection and Testing**	:	Please refer **ANNEX – B**
5.	**Possible tests in a day**	:	All except Iron Content
6.	**Scope of the Licence:**		
	"Licence is granted to use Standard Mark on product as per IS 12210: 2023		
	Name of the Product	*Caprolactam*	
	Form (s)	*Flakes and/or Crystals*	

ANNEX A

List of Test Equipment

(INDICATIVE LIST FOR GUIDANCE ONLY)

Sl. No.	Tests used in with Clause Reference	Test Equipment
1.	Permanganate number (Cl. 3.2, Table 1, Sl No. i)	• Nessler tubes with marks at 50 ml and 100 ml with ground-on optically clear glass caps • Constant temperature bath • Pipette — capable of delivering 1.0 ml • Interval timer and clock-capable of measuring a time interval of 120 min or more • Potassium permanganate solution • Copper Sulphate-Cobaltous Chloride Standard Solution • Double distilled water • Weighing balance
2.	Volatile base (Cl. 3.2, Table 1, Sl No. ii)	• Distillation apparatus with Kjeldahl distillation flask • Wash – bottle • 500 ml Conical flask • 250 ml Measuring cylinder • Microburette-10ml • Sodium hydroxide Solution • Sulphuric Acid • Methyl red • Methyl blue • Pumice grains • Weighing Balance
3.	Solidification point (Cl. 3.2, Table 1, Sl No. iii)	• Thermometer with L.C. 0.1° C and 0.5° C • 1 mm Dia SS stirrer • Outer tube ~~(300 mm)~~ • Inner tube ~~(200 mm)~~ • Erlenmeyer Flask (400 ml) • Heater • Asbestos board • Cooling Bath (With Glycerine)
4.	Colour (Cl. 3.2, Table 1, Sl No. iv)	• Colourless Nessler's tube-100 ml • Potassium Chloroplatinate • Cobalt Chloride • Hydrochloric Acid • Distilled Water

5.	Iron Content (Cl. 3.2, Table 1, Sl No. v)	• Spectrophotometer • 50 ml and 100 ml High Silica glass, Silica or porcelain dishes • Watch glass • Weighing balance • Iron Wire (Min. 99.85 % pure) • Nitric Acid (Sp. Gravity 1.42) • Hydroxylamine Hydrochloride Solution • Hydroquinone Solution • 1-10-Phenanthroline Solution • Sodium Acetate Solution • Weighing Balance • Muffle furnace
6.	Oxime Content (Cl. 3.2, Table 1, Sl No. vi)	• Spectrophotometer with 10 mm cell • Flask with ground glass stopper with Liebig Condensor • 25 ml and 100 ml graduated Cylinder • Pipette (5 ml, 15 ml and 50 ml) • Volumetric flask (100 ml) • Funnel (55 mm Dia) • Microburette • Sulphanilic Acid Solution • Iodine Solution • Sodium Acetate • 1-Naphthylamine Solution • Sodium Thiosulphate Solution • Standard Cyclohexanone Oxime Solution
7.	Free Acidity or Free Alkalinity (Cl. 3.2, Table 1, Sl No. vii)	• Erlenmeyer flask with stopper (250 ml) • Burette (250 ml capacity with 0.05 ml graduations) • Analytical Balance • Sodium Hydroxide Solution • Sulphuric Acid • Methyl red • Methylene blue
8.	Moisture Content (Cl. 3.2, Table 1, Sl No. viii)	• Karl Fischer Titrator • Pyridine • KF reagent • Oxalic Acid • Conc. Sulphuric Acid
9.	Matter Insoluble in Water (Cl. 3.2, Table 1, Sl No. ix)	• Sintered glass crucible (G4) – 30 ml • Wash Bottle • Beaker (2.5 L) • Oven • Desiccator • Acetone • Double Distilled Water • Weighing balance

10.	Absorbance (Cl. 3.2, Table 1, Sl No. x)	• UV Molecular Absorption Spectrometer (with hydrogen or deuterium lamp) • Quartz cell (1 mm) • Weighing Balance

ANNEX B

SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is: A single batch of product, produced from same raw materials and under similar conditions of production.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in Table 1.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING - It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as “R” or other tests which can be subcontracted as “S”. Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as “R” in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster-based facilities as per guidelines for the utilization of cluster-based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as “R” in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 **TEST RECORDS** - The manufacturers maintaining an in-house laboratory or utilizing common cluster-based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empaneled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. **PACKING AND MARKING** - The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on each 25 Kg bags/ Paper bags/ any other packing as agreed to between purchaser and supplier.

3.1 Packing and Marking shall be done as per as per Cl. 4 of IS 12210: 2023.

3.2 Additional Marking requirements: The material shall also be marked with the following additional requirement on each container:

a) “For BIS certification details please visit www.bis.gov.in”

4. **REJECTION** - All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1
LEVELS OF CONTROL

(1)				(2)	(3)		
Clause	**Requirements**	**Test Method**		**Test equipment requirement R: required (or) S: Sub-contracting permitted**	**No of Samples**	**Frequency**	**Remarks**
		Clause	**Ref.**				
3.1	Description	3.1	IS 12210	R	Firm to have adequate in-process controls to check compliance of this parameter as given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity.		
3.2	Permanganate Number	Annex A	IS 12210	R	One	Each Control unit	
3.2	Volatile base	Annex - B	IS 12210	R	One	Each Control unit	
3.2	Solidification point	Annex – C	IS 12210	R	One	Each Control unit	
3.2	Colour	Annex – D	IS 12210	R	One	Each Control unit	
3.2	Iron Content	Annex – E	IS 12210	R	One	Each Control unit	
3.2	Oxime Content	Annex – F	IS 12210	R	One	Each Control unit	
3.2	Free Acidity or free Alkalanity	Annex – G	IS 12210	R	One	Each Control unit	
3.2	Moisture Content	Annex - H	IS 12210	R	One	Each Control unit	
3.2	Matter insoluble in water	Annex - J	IS 12210	R	One	Each Control unit	
3.2	Absorbance	Annex - K	IS 12210	R	One	Each Control unit	