

SPECIFICATION

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NOTE : This specification partly agrees with UNI EN ISO standard 3269 (2002).

This Standard replaces IVECO STD. 18-0505 Part 11 ed. 1 dated 25.07.1985.

1 SUBJECT AND VALIDITY

- 1.1 The present specification within the sphere of validity defined in IVECO STD. 18-0505 sets out the criteria for approval or refusal concerning bolts and nuts in batches, in supplied condition.
- 1.2 Unless specified differently on drawing, procedures mentioned in the present specification, represent the only criteria valid for approval or refusal of batches. Test procedures for approval or refusal of bolts and nuts are based on statistical sampling methods for quality following UNI ISO 2859 Part 1-2-3 (2001).
- 1.3 If, during application of the sampling plan established in the present specification, a number of defects and/or defective units bigger than the admissible number (NA) is found in a sample drawn randomly, the batch is refused completely.
- 1.4 In case of dispute with supplier, the test of a batch, is repeated in the presence of the supplier. The result of this test is to be considered conclusive.

Edition	Date	Description of modifications	Group
1	25.07.1985		CFO
2	11.05.2004	Completely revised for updating. It was 18-0505 Part 11.	
3	27.01.2006	Modified: Manager and Supervisor Dept. Strength class 4.8 to point 4 added.	

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In case of dispute the only valid reference is the original Italian edition.

2 IN GENERAL

- 2.1 The manufacturer can select whatever means are appropriate to inspect production, but must be sure to do all that is required at each stage of production so as to guarantee that units of production satisfy the requirements on drawing or in specifications.
- 2.2 The supplier can re-submit a batch which has been refused after appropriate selection or correction of defective parts and after having verified the level of quality required.
- 2.3 Any corrective operation whatsoever which modifies the product specification is not allowed unless it is communicated beforehand to those concerned in IVECO Purchasing Department and approved.

3 TERMS AND DEFINITIONS

In the present standard we use terms and definitions conforming with UNI ISO 3534 (2000); the following are given below:

3.1 Batch

Quantity of units belonging to the same type, dimensions and material, presented only once by the supplier for testing.

3.2 N batch number

Number of units of production contained in a batch of bolts and nuts.

3.3 Sample

One or more units of production drawn at random from the batch of bolts and nuts, making sure that all units have the same chance of being drawn.

3.4 N sample number

Number of units of production contained in the sample.

3.5 Specification

Whatever dimensional or mechanical attribute is recognizable in the unit, whose limit values can be specified.

In this standard, specifications are classified into the following groups:

- I visual characteristics;
- II chemical, mechanical and quality specifications;
- III main specifications;
- IV secondary specifications.

3.6 Defect

Any property of a unit of production non conforming to the requirements in the standard or drawing. For required levels of quality, (see point 4), defects can be divided into:

- defects which can be singled out with non-destructive tests;
- defects which must be singled out with destructive tests or non-destructive endurance tests.

3.7 Defective unit

unit which shows one or more defects.

3.8 Sample plan

plan according to number of units of product bolts and nuts coming from each batch to be checked (n sample number) and criteria to establish batch approval (NA, admissible number) are decided.

3.9 NA admissible number

maximum number of defects or defective units in the sample which still allows approval of batch.

3.10 LQA acceptable level of quality

percentage of defects or defective units, present in a batch, for which there is a probability, in the present standard of varying from 99% to approx. 88%, that purchaser accepts each batch.


3.11 LQT tolerable level of quality

percentage of defects or defective units, present in a batch, for which there is a probability, in this standard equal to 10%, that purchaser accepts batch.

4 LEVELS OF QUALITY OF BOLTS AND NUTS

In order to differentiate the levels of reliability to be attained by various types of bolts and nuts, this has been subdivided into the following levels of quality:

- 1st LEVEL: HIGH RELIABILITY*
Specified for screws and nuts having R10 and R12 strength classes and for screws rolled after hardening and tempering to strength classes 10R and 12R.
- 2nd LEVEL: STANDARD RELIABILITY*
Specified for 8.8, 10.9 and 12.9 strength class screws and for 8, 10, 12 and 05 strength class nuts.
- 3rd LEVEL: STANDARD RELIABILITY
Specified for 4.6, 4.8, 5.8 strength class screws and 4, 5 and 04 strength class nuts.

* For safety bolts and nuts, marked on drawing or standard with symbol , test of safety properties shown on drawing or standard is carried out at 100% (see IVECO STD. 18-0011: ICQ=0). In this case, if a unit of a batch is not conforming, the whole batch is refused.

5 TEST

5.1 For verification of properties required, sample plans for attributes in agreement with ISO 2859 Part 1-2-3 (2001) are valid.

 5.2 In **Table I** LQA value is laid down for every defect considered individually and LQA value for defective unit examining one or more defects on the whole concerning each group.

TABLE I – Admissible quality levels

Group	PROPERTIES	LQA FOR						Screws	Screw studs	Nuts
		DEFECTS			DEFECTIVE UNITS					
		1st LEVEL	2nd LEVEL	3rd LEVEL	1st LEVEL	2nd LEVEL	3rd LEVEL			
I	Abnormal parts or * greatly damaged, deformed or incomplete parts	–	–	–	0.25	0.40	0.65	X	X	X
II	Surface defects not admissible	–	–	–	0.10	0.40	0.65	X	X	X
	Locking moment	1	1.5	–	–	–	–	–	–	X ♦
	Mechanical or ** metallurgical defects not admissible	–	–	–	0.025	0.10 to 0.40	0.15 to 0.65	X	X	X
III	Thread diameters	0.65	1	1.5	1.5	2.5	4	X	X	X
	Radius of thread bottom	0.65	1	–				X	X	X
	Driving dimensions	1	1	1.5				X	–	X
	Radius of under head connection	0.65	1	1.5				X	–	–
	Perpendicularity between bearing surface and thread axis	0.65	1	1.5				X	–	X
	Bearing surface roughness	0.65	1	1.5				X	–	X
	Smooth shank diameter (with exact tolerance)	0.65	1	–				X	X	–
	Collar diameter (d _w)	1	1	1.5				X	–	X
	Concentricity between shank edge of thread and root edge	1	1	1.5				–	X	–
IV	All other IVECO STD. 18-0505 instructions, product standards or drawings	1.5	2.5	4	4	6.5	10	X	X	X

* Parts are considered abnormal (that is to say with markedly different shape) or greatly damaged, distorted or incomplete if such irregularities can be quickly picked out by sight, therefore, such products need not ever be used even by mistake.

** This test is carried out using magnetic means to pick out units to subject to destructive tests to verify defects concerning chemical analysis, mechanical properties and decarburization.

♦ Specified for testing of selflocking nuts mentioned in IVECO STD. 18-0505 Enclosure 5.

5.3 Non destructive tests. In **Table II** is given a sample plan for non-destructive tests and, for information, LQT tolerable quality levels according to required LQA and sample number.

TABLE II – Sample plan for non destructive tests

N	n	LQA									
		0.025		0.10		0.25		0.40		0.65	
		NA	LQT	NA	LQT	NA	LQT	NA	LQT	NA	LQT
Up to 90	13	↓		↓		↓		↓		↓	
91 to 150	20	↓		↓		↓		↓		↓	
151 to 280	32	↓		↓		↓		↓		↓	
281 to 500	50	↓		↓		↓		↓		↓	
501 to 1200	80	↓		↓		↓		↓		1	4.8
1201 to 3200	125	↓		↓		↓		1	3.1	2	4.3
3201 to 10 000	200	↓		↓		1	2.0	2	2.7	3	3.3
10001 to 35000	315	↓		↓		2	1.7	3	2.1	5	2.9
35001 and over	500	0	0.46	1	0.78	3	1.3	5	1.9	7	2.4

N	n	LQA											
		1.0		1.5		2.5		4.0		6.5		10	
		NA	LQT	NA	LQT	NA	LQT	NA	LQT	NA	LQT	NA	LQT
Up to 90	13	↓		↓		↓		1	27*	2	36	3	44
91 to 150	20	↓		↓		1	18*	2	25*	3	30	5	42
151 to 280	32	↓		1	12	2	16*	3	20*	5	27	7	34
281 to 500	50	1	7.8	2	11	3	13	5	18*	7	22	(10)	29
501 to 1200	80	2	6.7	3	8.4	5	11*	7	14*	(10)	19	(14)	24
1201 to 3200	125	3	5.4	5	7.4	7	9.4	(10)	12	(14)	16		
3201 to 10 000	200	5	4.6	7	5.9	(10)	7.7	(14)	10				
10001 to 35000	315	7	3.7	↑		(14)	6.4						
35001 and over	500	↑		↑									

NOTE 1: LQT values refer either to defective units or to defects themselves. As far as defects are concerned, values with an asterisk are in reality slightly bigger than the ones mentioned.

NOTE 2: If there is an arrow present, the sample plan indicated by this must be followed. If the sample number exceeds the batch number, 100% must be tested.

NOTE 3: NA values in brackets are only used for verification of defective units.

5.4 Destructive tests. In **Table III** are given destructive tests to be carried out on sample.

TABLE III – Destructive tests

TEST ♦	SCREWS WITH HEXAGONAL HEAD OR SOCKET HEAD	SCREWS WITH NOTCHED SCREW HEAD CROSS OR STUDS INDENTATION	SCREW STUDS	NUTS
Tensile stress *	X	X •	X	–
Hardness *	X	X	X	X
Test load *	X	–	–	X
Extension *	–	–	–	X
Resilience *	X	–	X	–
Toughness of head *	X	X	–	–
Thread quality *	X	X	X	–
Decarburization *⊕	X	X	X	X
Locking moment ▽	–	–	–	X
Surface coatings **	X	X	X	X

* Tests to be verified with **Table IV** sample plan.

** Tests to be verified with **Table V** sample plan.

⊕ For quality 1st and 2nd level bolts and nuts.

• Only for determination of breaking load.

▽ For self-locking nuts to be verified with sample plan 5.

♦ On drawing or product standard other tests of properties can be specified.

5.4.1 As far as destructive tests of properties in group II are concerned, if means of magnetic checking are available and other similar non-destructive systems, carry out a preliminary test on a sample whose number **n** is shown in **Table IV** and only those units which show values within the limits of the properties to be tested are subjected to destructive testing.

TABLE IV

Sample plan for destructive or endurance non-destructive tests of units of product chosen by magnetic means (destructive tests for surface coatings excluded, for which **Table V** is valid, and locking moment for nuts, for which **Table VI** is valid).

N	NA	1st LEVEL			2nd LEVEL			3rd LEVEL		
		n	LQA	LQT	n	LQA	LQT	n	LQA	LQT
Up to 500	0				32	0.40	6.9	20	0.65	11
501 to 1200	0				50	0.25	4.5	32	0.40	6.9
1201 to 35000	0	500	0.025	0.46	80	0.15	2.8	50	0.25	4.5
35001 and over	0				125	0.10	1.8	80	0.15	2.8

5.4.2 To test surface coatings by destructive tests we adopt the sample plan in **Table V**.

TABLE V – Sample plan for destructive tests of surface coatings

N	NA	1ST LEVEL AND 2ND LEVEL			3RD LEVEL		
		n	LQA	LQT	n	LQA	LQT
Up to 500	0	5	2.5	37	3	4.0	54
501 to 1 200	0	5	2.5	37	5	2.5	37
1 201 to 35000	0	8	1.5	25	5	2.5	37
35 001 and over	0	13	1.0	16	8	1.5	25

5.4.3 For verification of locking moment of self locking nuts, we adopt the sample plan in **Table VI**.

TABLE VI – Sample plan for destructive testing of the locking torque of self-locking nuts

N	NA	1ST LEVEL			2ND LEVEL		
		n	LQA	LQT	n	LQA	LQT
Any	0	13	1.0	18	8	1.5	29

STANDARDS QUOTED

IVECO STD.: 18-0011, 18-0505, 18-0505 Enclosure 5.

UNI EN ISO: 3269 (2002).

UNI ISO: 2859 Part 1-2-3 (2001), 3534 (2000).