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VIETNAM NATIONAL STANDARD

TCVN 3254 : 1989

Fire protection - General safety Requirements

(This English version is for reference only)

Ha Noi - 2008

Foreword

TCVN 3254 : 1989 was prepared by Institute for Science, Technology Research on Labour Protection, Vietnam Labour Confederation, Department of Fire Protection and Prevention- the Ministry of Interior, proposed by the Directorate for Standard and Quality, and issued by the Ministry of Science, Technology and Environment (now renamed as Ministry of Science and Technology).

This standard was transferred in 2008 from Vietnam standard into Vietnam National standard under the same identifier number, as stipulated in Section 1, Article 69 of the Law on Standards and Technical Regulations and in Point a, Section 1, Article 6 of Decree No 127/2007/ND-CP of the Government dated 01 August 2007 detailing the implementation of a number of articles of the Law on Standards and Technical Regulation.

Fire protection - General safety requirement

This standard applies to production establishments, domestic and public works belonging to the national economies and defines general requirements for assuring fire protection for these works.

Definitions of terms used in this standard are given in Annex 1.

1 General requirements:

1.1 Besides requirements given in this standard, establishments shall conform to requirements in TCVN 2622 : 1978, standards and rules on fire protection for special works.

1.2 In order to ensure fire protection, it is necessary to have:

Fire prevention system;

Fire protection system.

1.3 Fire prevention system shall be studied to define for each specific work, so when using, fire cannot occur.

1.4 Fire prevention system shall be studied to define for each specific work, so when a fire occurs, it is capable of limiting scale, extinguishing fire for protecting man and works.

1.5 Necessary calculations for fire prevention and protection system, as well as determination of initial data for this calculation shall be carried out in accordance with issued documents, standards by ministries and the Directorate.

1.6 Harmful and hazardous factors due to fire affecting to human including:

Fire and spark;

High temperature of air and objects;

Hazardous elements due to fire;

Smoke;

Reduced oxygen (O_2) concentration;

Breaking of houses, works and equipments;

Explosion.

1.7 Man shall be safely ensured when the fire occurs at any places of works.

1.8 It is necessary to ensure fire protection for works when in normal operation, as well as when in reconstruction, repair and having breakdown.

1.9 Each establishment shall calculate the economic efficiency of fire protection and prevention measures.

2 Requirements for fire prevention system:

2.1 In order to prevent fire, the following measures shall be carried out:

Prevent the creation of a fire hazard environment;

Prevent the creation of fire cause sources in the fire hazard environment;

Keep the temperature of fire hazard environment lower than the combustible permissible limit temperature;

Keep the pressure in the fire hazard environment lower than the combustible permissible limit pressure;

Reduce the scale of forming fire hazard environment lower than the permissible limit scale according to fire nature;

2.2 In order to prevent the forming of fire hazard environment, it is necessary to conform to regulations on:

Permissible concentration of flammable substances at gas, vapour form or substances at dust form;

Necessary concentration of fire retardant substances in flammable substances at gas, vapour and liquid form;

Permissible concentration of oxygen(O_2) or other oxidation substances in gas or mixture of flammable substances.;

Fire hazard indexes of the matters are given in Annex 2 of this standard.

2.3 In order to prevent the forming of fire cause source in the fire hazard environment, it is necessary to:

Have regulations on design, manufacture, operation, maintenance of machines, equipment, materials and products that can be fire sources in the fire hazard environment;

Use electrical appliances suitable to fire and explosive hazard level of apartment, room, equipments placed outside and suitable to group, kind of fire, explosive hazard mixture;

Use technological and technical process satisfying safety requirements on electrostatic spark;

Have measures to prevent thunderbolt, earthing for houses, works and equipments;

Define the maximum permissible temperature of the surface of equipments, products and materials when contacting with the fire hazard environment;

Define the maximum permissible energy of electric spark in the fire hazard environment ;

Define the maximum permissible temperature when warming up flammable structures, materials and substances;

Use tools not creating spark when working with flammable substances;

Eliminate the contact between fire conductance substances and objects that have been burnt exceeding temperature regulated in 2.3 with the air;

Eliminate the probabilities that can lead to self-ignition due to heat, chemical or bioligical reaction from substances, materials, products and structure of work;

Forbid to use bare flame in the fire hazard environment.

3 Requirements for fire protection system

3.1 For fire protection, it is necessary to carry out the following measures:

Use unburned and uninflammable substances and materials at the highest level for replacing inflammable ones;

Limit the number of flammable substances and soundly arrange these substances;

Isolate the fire hazard environment;

Prevent the fire spread;

Use work structures with fire-resistance limit suitable to fire, explosion hazard level;

Have exit way;

Use personal and public protection equipments;

Use fire extinguishers;

Use smoke exit system;

Use automatic fire alarm equipments and other means.

Organize force for fire alarm at the establishments.

3.2 In order to limit amounts of inflammable substances, it is necessary to conform to the following regulations:

Define amount (quantity, volume) of inflammable substances and materials that are permissible to store in rooms, apartments and stocks together.

Have inflammable gas and liquid exhaust system apart from equipments when breakdown occurs.

Regularly clean rooms, apartments, pipeline and equipments;

Have regulations for workplace using fire hazard substances;

Have waste absorption system in the production;

Have fire protection space and protection area.

3.3 The fire hazard environment shall be isolated by the following measures:

Mechanize and automatize the technological processes relating to usage and transport of fire hazard substances to the highest level;

Place fire hazard equipment in the isolation room or outside;

Use closed equipments (or sealed);

Should have packing for fire hazard substances;

Have protection structure against breakdown for production equipment using fire hazard substances;

Use isolated walls, cabinet, room, chamber...

3.4 In order to prevent fire spreading, the following measures shall be carried out:

Use fire partitions parts (protection wall, area, curtain, belt...);

Use switchgears on equipments and pipeline when breakdown occurs;

Use equipments for preventing spread and overflow of liquids when firing;

Regulate the permissible limit area of fire protection sections and compartments;

Use safety films in equipments and pipelines.

3.5 Equipments used in fire extinction should control the fire to the maximum level, at the same time including the following requirements:

Type of equipments can and cannot be used for fire extinction.

Type, number, the way to place and maintain fixed fire extinguishing means (fire extinguishers, asbestos cloth, primitive cloth, sand tank, water tank...).

Regulations on preserving special fire extinguishing substances.

Water sources and means of supplying water for fire extinction

The minimum permissible reserved amount of fire extinguishing substances (powder, gas, mixtures...).

The necessary increasing velocity of technical means for fire fighting.

Kind, number of capacity and rapid effect of fire fighting equipment system.

Location and maintenance of fire fighting equipments.

Regulation of serving and inspecting fire fighting equipments and means.

3.6 Structure of works shall have suitable fire- resistant limit for ensuring to maintain force resistance and continuously support in an interval of time enough for people exit or come to a shelter. This fire-resistant limit should be defined at the condition not concerning the impact of fire fighting means on fire when spreading.

In order to limit the spread of fire, the fire- resistant limit of work structure is also defined basing on fire dangerousness of the production process.

3.7 Each work should have technical plan and is soundly arranged assuring that the people can escape from dangerous areas quickly before hazardous and harmful factors due to fire reach the permissible level.

For ensuring exit, it is necessary to:

Regulate dimension, number of entrance and exit way.

The exit way should be convenient for people to go.

3.8 Personal and public protection means should ensure safety for man during the time under the influence of hazardous factors due to fire. Personal and public protection means should be available in case of that it is difficult to exit outside and not necessary.

3.8.1 Members of the professional fire fighting team shall be equipped with personal protection means.

3.8.2 The public protection means can be shelters, protection rooms, apartments or work structures.

3.9 Smoke exhaustion system shall ensure not to have smoke in exit way within the interval of time enough for all people exit outside.

3.10 Each establishment shall be equipped with reliable information system or fire alarm signals for timely inform when the fire just happened.

3.11 In order to ensure the possibility to extinguish fire and safety for fire-fighting participants, all works should equip with necessary technical means (safety ladders, rooms, fire fighting ladders outside, emergency exits...). These means must be regularly in operation.

4 Organizational measures for ensuring fire protection.

4.1 Header or director of each unit, establishment shall be responsible for building organizational and technical measures in order to ensure fire protection for their unit, establishment.

4.2 Each unit must establish specific fire fighting projects so that when fire happens, they can timely extinguish fire and minimize human and property damage.

4.3 Organize fire fighting and prevention teams.

Operation regulations of the fire fighting and prevention teams should base on specific condition of each unit and under the guidance of the state fire fighting and prevention office.

4.4 Organize to train the officials, workers, employees on regulations and techniques of fire protection and prevention.

4.5 Propagate standards, technical regulations on fire protection and necessary instructions when contacting with fire hazard materials and substances.

4.6 Use communication and information means for popularizing the work of fire prevention and protection.

4.7 Periodically organize to check the implementation of regulations on fire prevention and protection.

5 Requirements when developing specific standards on fire protection.

5.1 Regulations and requirements on fire protection in the specific standards should be studied and prepared in accordance with this standard and other related documents.

5.2 Regulations and requirements on fire protection of branch, company, local and buildings standards should include:

Specific measures on fire prevention and protection.

Type, number of fire fighting means and requirements when controlling to each type.

5.3 Standards on fire fighting means shall include:

Qualitative and quantitative norms of fire fighting means.

Technical requirements on structure of fire fighting means.

5.4 In standards and technical requirements of fire hazard products, substances and materials, it is necessary to clearly note fire hazard specifications.

Annex 1

Terms and definitions

Number	Terms	Definitions
1	Fire	Combustion spreading uncontrolled causing human and property damages.
2	Fire protection	The situation or features of works, production equipments... ensuring to prevent the forming of fire and limit effects due to fire by organizational, technological and technical measures.
3	Fire prevention system	Combination of all requirements, technological means and measures for eliminating the possibility of a fire occurring .
4	Fire protection system	Combination of all requirements, technological means and measures for preventing fire, limit fire spread, preventing harmful and hazardous factors to man, minimizing human and property damages.
5	Fire extinguishing	Activity of forces and means for preventing fire spread and extinguishing the fire.
6	Inflammability	Capable of burning with a flame of the matter under the specific existing conditions of burning.
7	Smoke exit system	Combination of organizational, technological measures for bringing smoke in houses and works when on fire out
8	Fire cause source	Energy source causing combustion of the matter
9	Fire hazard environment	The environment contains mixture of flammable substances and oxidation substance.
10	Exit way	The way to exit door (TCVN 3991 : 1985).
11	Fire resistant limit	Time (by hour or minute) from the beginning of testing fire resistance in accordance with standard on specimens to the time of appearing one of limit states of structure and component (TCVN 3991 : 1985).

Annex 2

Basic index of fire hazard substances

Conventional symbols used in the reference tables of this standard:

M: Molecular weight. For each specific substance, molecular weight is defined in accordance with international conventions in 1971 on applied and refined chemistry.

For technical products and multi-component mixture, its molecular weight is defined by chemical composition or conventional chemical formula.

A, B, C are numerals of Antyan equation (1) showing the dependence between saturated vapour pressure of substances (mixtures) and the temperature (t).

$$\lg P = A - \frac{B}{t + C_A} \quad (1)$$

P: Pressure of vapour (mm Hg)

t: Temperature (^oC)

t_{bc}: Self-ignition temperature of closed glass (^oC)

φ_d^0: Lower flammable concentration limit of gas or vapour in air under the atmosphere pressure is defined at the temperature of 25^{o}C (calculated by 2 of volume). This quantity is used for calculating lower flammable concentration limit of some substances at any temperature t in accordance with the following formula:

$$\varphi_{d,t} = \varphi_d^0 \ (1{,}020 - 0{,}000799.t) \qquad (2)$$

$\varphi^o_{d,t}$: Lower flammable concentration limit of gas or vapour in air under the atmosphere pressure and temperature t (% of volume).

K_{at}: Safety factor to lower flammable concentration limit. This factor is used for defining permissible limit of explosion safety concentration according to the following formula (when unburned safety level of the mixture is 0,999).

$$GCNAN = \frac{\varphi^o_{d,t}}{K_{at}} \quad (3)$$

GCNAN : Permissible limit of explosion safety concentration.

In case of calculating GCNAN for physically inhomogeneous mixtures including mixture and gas, value of the safety factor given in table 1 and 2 should multiply with 5.

D_o- Diffusion factor of gas (or vapour) in air under the pressure condition 1at and temperature 0^oC (cm^2/s). This factor is used for calculating diffusion factor D_t (cm^2/s) at any temperature T according to the following formula:

$$D_t = D_o\left(\frac{T}{273}\right) \quad (4)$$

T: Temperature, K;

n: Experimental index, value of this index is given at the last column of table 1 and 2.

At column 8 of table 1 and 2 having the following conventional symbol:

CKC - Unburned substance- the substance incapable of burning in the air with normal composition;

CKC - uninflammable substance- the substance capable of burning when putting the fire in, but not maintaining the combustion when putting the fire out;

CC - Flammable substance, the substance can continue burning after taking the fire out.

CCL - Liquid flammable substance, the liquid capable of self-igniting after putting the fire out and having self-ignition temperature higher than 61^oC (in closed glass) or 66^oC (in open glass).

CLDC - Inflammable liquid, the liquid capable of maintaining combustion after putting the fire out and having self-ignition temperature not exceeding 61^oC (in closed glass) or 66^oC (in open glass).

CCK - Gas flammable substance, the substance that is difficult to create explosion and combustion mixture with the air at the temperature not exceeding 55^oC.

CNN - Explosion hazard substance, the substance capable of exploding or detonating without atmospheric oxygen.

Table 1 - Value of fire hazard indexes of special substances

Substance	Chemical formula	M	Constant of Antyan equation			Temperature distance of constant value of Antyan equation	Inflammability, ignition and explosion hazard	t_{bc} o_C	φ^o_d % volume	K_{at}	D_o cm^2/s	n
			A	B	C							
1	2	3	4	5	6	7	8	9	10	11	12	13
Amylacetate	$C_7H_{14}O_2$	130.196	7.16870	1579.510	221.365	25 ÷147	CLDC	25	1.08	1.35	0.0520	1.87
Amylene	C_5H_{10}	70.134	6.78568	1014.294	229.783	60 ÷100	CLDC	<-18	1.49	1.48	0.0690	1.84
Amylene alcohol	$C_5H_{12}O$	88.149	7.18246	1287.625	161.330	74 ÷157	CLPC	49	1.48	2	0.0661	1.87
Ammonia	NH_3	17.030	-	-	-	-	CCK	-	17.0	1.38	0.198	1.88
Aniline	C_6H_7N	93.128	6.92129	1457.020	176.195	35 ÷184	CCL	73	1.32	1.37	0.0622	1.87
Acetaldehyde	C_2H_4O	44.053	7.19160	1093.537	233.413	80 ÷20	CCK	-38	4.12	1.26	0.11	1.83
Acetylene	C_2H_2	26.038	-	-	-	-	CNN	-	2.5	2	0.18	1.79
Benzene	C_6H_6	78.113	6.48898	902.275	178.099	0 ÷ 6	CLDC	-12	1.43	1.37	0.0775	1.86
Butadiene 1.3	C_4H_6	54.091	-	-	-	-	CCK		2.02	1.29	0.0806	1.82
Butane	C_4H_{10}	58.123	-	-	-	-	CCK		1.799	1.24	0.0605	1.87
1- Butene	C_4H_8	56.107	-	-	-	-	CCK	-	1.81	1.39	0.0801	1.83
2- Butene	C_4H_8	56.107	-	-	-	-	CCK	-	1.85	1.31	0.0801	1.82

Table 1 (continuous)

Butyl acetate	$C_6H_{12}O_2$	116.160	7.00641	1340.743	199.757	0÷100	CLDC	29	1.43	2	0.0574	1.87
Butyl alcohol	$C_4H_{10}O$	74.122	9.59730	2664.684	279.638	1÷126	CLDC	38	1.81	2	0.0681	1.86
Hydro	H_2	2.016	-	-	-	-	CCK		4.09	1.24	0.66	1.70
Vinyl chloride	C_2H_3Cl	62.499	-	-	-	-	CCK		4.0	1.36	0.104	1.82
Hexadecane	$C_{16}H_{34}$	226.445	6.78749	1655.405	136.869	105÷287	CCL	128	0.473	1.56	0.0347	1.86
Hexane	C_6H_{14}	86.177	6.87024	1166.274	223.661	-54÷69	CLDC	-23	1.242	1.24	0.0663	1.55
Hexyl alcohol	$C_6H_{14}O$	102.176	7.27800	1420.273	165.469	56÷157	CCL	63	1.23	1.37	0.0988	1.87
Heptane	C_7H_{16}	100.203	6.95154	1295.405	219.819	-60÷98	CLDC	-4	1.074	1.24	0.0609	1.54
Hydrazine	N_2H_4	32.045	8.87325	2266.447	266.316	84÷112	CNN	38	4.7	2	0.167	1.86
Glycerine	$C_3H_8O_3$	92.094	9.05259	3074.220	214.712	141÷263	CCL	198	3.09	2	0.08	1.9
Decane	$C_{10}H_{22}$	142.284	7.39530	1809.975	227.700	17÷174	CLDC	47	0.760	1.24	0.0502	1.45
Divinyl Ether	C_4H_6O	70.091	6.98810	1055.259	228.589	-40÷60	CLDC	<-30	2.0	1.66	0.0765	1.84
Dimethyl Ether	C_2H_6O	46.069	-	-	-	-	CCK	-	3.49	2	0.108	1.85
Dimethyl Formamide	C_3H_7NO	73.094	7.03446	1482.985	204.342	25÷153	CLDC	58	2.35	1.3	0.0898	1.87
Dioxan-1,4	$C_4H_8O_2$	88.106	7.51611	1632.425	250.725	12÷101	CLDC	11	2.14	1.72	0.0758	1.85
Difluorodichloromethane	$C_2F_2Cl_2$	120.914	-	-	-	-	CKC	-	None	-	0.0806	1.81
1,2- Dichloroethane	$C_2H_4Cl_2$	98.960	7.66135	1640.179	259.715	-24÷83	CLDC	12	4.60	1.32	0.0845	1.86

Table 1 (continuous)

Diethylamine	$C_4H_{11}N$	73.138	7.22314	1267.557	236.329	-33÷59	CLDC	-26	1.77	1.30	0.0756	1.85
Diethyl Ether	$C_4H_{10}O$	74.122	6.99790	1098.945	232.372	-60÷35	CLDC	-43	1.9	1.3	0.0772	2.14
Dodecane	$C_{12}H_{26}$	170.337	8.1781	2463.739	253.884	48÷214	CCL	77	0.634	1.36	0.0399	1.88
Isobutane	C_4H_{10}	58.123	-	-	-	-	CCK	-	1.81	1.21	0.0819	1.87
Isobutylene	C_4H_8	56.11	-	-	-	-	CCK	-	1.78	1.31	0.0801	1.82
Isobutylene Alcohol	$C_4H_{10}O$	74.122	8.70512	2058.392	245.642	-9÷116	CLDC	28	1.81	2	0.0756	1.87
Iso-Pentane	C_5H_{12}	72.150	6.79306	1022.551	233.493	-83÷28	CLDC	-52	1.36	1.32	0.0700	1.76
Iso-Propylbenzene	C_9H_{12}	120.194	6.93773	1460.668	207.652	3÷153	CLDC	36	0.93	2	0.0615	1.87
Iso Propyl Alcohol	C_3H_8O	60.096	8.38562	1733.000	232.380	-26÷148	CLDC	13	2.23	1.76	0.0831	1.92
m-Xylol	C_8H_{10}	106.167	7.00849	1461.925	215.073	-20÷220	CLDC	25	1.00	2	0.0671	1.87
O-Xylol	C_8H_{10}	106.167	6.99891	1474.679	213.686	-20÷220	CLDC	32	1.00	2	0.0671	1.88
n-Xylol	C_8H_{10}	106.167	6.99184	1454.328	215.411	13÷220	CLDC	25	1.00	2	0.0671	1.87
Methane	CH_4	16.0426	-	-	-	-	CCK	-	5.28	1.26	0.196	1.76
Methyl Alcohol	C_4H_4O	32.042	8.22777	1660.454	245.818	-10÷90	CLDC	8	6.7	1.40	0.129	2.08
Methyl Propyl Ketone	$C_5H_{10}O$	86.133	7.8642	1870.4	273.2	-17÷103	CLDC	6	1.49	1.52	0.0664	1.86
Methyl Ethyl Ketone	C_4H_8O	72.107	7.02453	1292.791	232.340	-48÷80	CLDC	-6	1.90	1.46	0.0760	1.86
Naphthalene	$C_{10}H_8$	128.173	10.55455	3123.337	243.569	0÷80	CC	81	0.906	1.27	0.0622	1.89
N-Nonane	C_9H_{20}	128.257	7.05283	1510.695	211.502	2÷150	CLDC	31	0.843	1.24	0.0499	1.57
Carbon Oxide	CO	28.0104	-	-	-	-	CCK	-	12.5	1.9	0.149	1.72

Table 1 (continuous)

Ethylene Oxide	C_2H_4O	44.0530	-	-	-	-	CNN	-	3.66	1.78	0.110	1.83
N-Octane	C_8H_{18}	144.230	6.96903	1379.556	211.896	-14÷126	CLDC	14	0.945	1.24	0.0503	1.77
H-Pentadecane	$C_{15}H_{32}$	212.418	6.94237	1739.084	157.545	92÷270	CCL	115	0.505	1.50	0.0358	1.90
H-Pentane	C_5H_{12}	72.150	6.84715	1062.555	231.805	-50÷36	CLDC	-44	1.471	1.24	0.0729	1.83
R-Picoline	C_6H_7N	93.128	7.30064	1632.315	224.787	70÷145	CLDC	39	1.43	1.25	0.0754	1.88
Pyridine	C_5H_5N	79.101	6.78610	1217.730	196.342	-19÷116	CLDC	20	1.85	1.55	0.0828	1.87
Propene	C_3H_8	44.096	-	-	-	-	CCK	-	2.310	1.24	0.0977	1.80
Pyropylene	C_3H_6	42.080	-	-	-	-	CCK	-	2.300	1.32	0.0962	1.82
H- Propylene Alcohol	C_3H_8O	60.096	8.31708	1751.981	225.125	0÷97	CLDC	25	2.34	1.58	0.085	1.88
Hydrogen sulfide	H_2S	34.076	-	-	-	-	CCK	-	4.0	1.45	0.141	1.82
Carbon sulfide	CS_2	76.131	7.00048	1202.471	245.616	-15÷80	CLDC	-43	1.33	1.56	0.0890	1.69
Styrolene	C_8H_8	104.151	7.94049	2113.057	272.986	-7÷146	CLDC	31	1.06	1.32	0.0674	1.88
Tetrahydrofuran	C_4H_8O	72.107	5.99964	753.805	175.793	25÷66	CLDC	-16	1.78	1.94	0.0588	1.84
Tetradecane	$C_{14}H_{30}$	198.391	7.27514	1950.497	190.513	76÷254	CCL	103	0.542	1.45	0.0370	1.89
Toluene	C_7H_8	92.140	6.95508	1345.087	219.516	-30÷200	CLDC	4	1.25	1.4	0.0753	1.65
H.Tridecane	$C_{13}H_{28}$	184.364	7.96895	2468.910	250.310	59÷236	CCL	90	0.585	1.40	0.0384	1.89
2.2.4 - Trimethylpentane	C_8H_{18}	114.230	6.8117	1259.150	221.085	-15÷131	CLDC	-10	1.0	1.31	0.0427	1.86

Table 1 (finished)

Acetic acid (ideal gas)	$C_2H_4O_2$	60.052	-	-	-	-	-	-	5.5	2.0	-	-
Acetic acid	$C_{3,7}H_{7,4}O_{3,7}$	111.097	7.79846	1787.752	245.908	0÷118	CLDC	38	3.33	1.31	0.107	1.90
H.Undecane	$C_{11}H_{24}$	156.311	7.68008	2102.959	242.574	31÷197	CCL	62	0.692	1.32	0.0417	1.88
Formaldehyde	CH_2O	30.026	6.28480	607.399	197.626	-19÷60	CCK	-	7.0	1.3	0.146	1.81
Phthalic Anhydride	$C_8H_4O_3$	148.118	7.99959	2879.067	277.501	134÷285	CC	153	1.32	1.31	0.0616	1.87
Trichloro-fluoromethane	CCl_3F	138.368	-	-	-	-	CKC	-	None	-	0.0603	1.83
Chlorobenzene	C_6H_5Cl	112.558	7.26112	1607.316	235.351	-35÷132	CLDC	28	1.4	1.53	0.0628	2.09
Chloroethane	C_2H_5Cl	64.514	6.82723	954.119	229.554	-90÷12	CCK	-	3.92	1.38	0.0981	1.82
Cyclohexane	C_6H_{12}	84.161	6.64788	1095.531	210.064	-45÷81	CLDC	-18	1.31	1.75	0.0648	1.89
Ethane	C_2H_6	30.069	-	-	-	-	CKK	-	3.07	1.27	0.121	1.78
Ethyl acetate	$C_4H_8O_2$	88.106	6.99240	1200.297	214.262	-43÷77	CLDC	-3	2.28	1.44	0.0733	1.89
Ethyl benzene	C_8H_{10}	106.167	6.95904	1425.464	213.345	-20÷220	CLDC	24	1.03	1.58	0.0671	1.87
Ethylene	C_2H_4	88.054	-	-	-	-	CNN	-	3.11	1.2	0.109	1.80
Ethylene Glycol	$C_2H_6O_2$	62.068	9.01261	2753.183	252.009	53÷198	CCL	112	4.29	2	0.099	1.87
Ethyl Alcohol	C_2H_6O	46.069	8.68665	1918.508	252.125	-31÷78	CLDC	13	3.61	2	0.110	1.51
Ethyl Cellosolve	$C_4H_{10}O_2$	90.122	8.74133	2392.56	273.15	20÷135	CLDC	43	2.00	2	0.0721	1.86

The substance that can be explosively disintegrated under high pressure and effect of fire source.

Table 2 - Value of fire hazard indexes of technical products and mixtures

Product, the State standard, mixture composition (% weight)	General formula	M	Constant of Antyan equation			Temperature distance of constant value of Antyan equation	Inflammability, ignition and explosion hazard	t_{BC} o_C	$\varphi^o d$ % volume	K_{at}	D_o cm^2/s	n
			A	B	C_A							
1	2	3	4	5	6	7	8	9	10	11	12	13
Petrol A-72	$C_{6.991}H_{13.108}$	97.2	5.07020	682.876	222.066	-60÷85	Cldc	-36	1.08	2	0.0605	2
Petrol A3-93	$C_{7.024}H_{13.706}$	98.2	4.99831	664.976	221.695	-60÷95	Cldc	-36	1.06	2	0.0613	2
Diesel fuel "Л" ГОСТ 305-73	$C_{12.343}H_{23.889}$	172.3	5.95338	1255.73	199.523	+40÷110	CLCD	>35	0.61	2	0.0470	2
Air petrol Б 70 ГОСТ 1012-72	$C_{7.267}H_{14.796}$	102.2	8.41944	2629.65	384.195	-40÷110	CLCD	-34	0.92	2	0.0573	2
Diesel fuel "Л" (ГОСТ 305-73)	$C_{14.511}H_{29.120}$	203.6	5.87629	1314.04	192.473	60÷240	CLCD	>40	0.52	2	0.0481	2
Burning kerosene КО.22. ГОСТ 4753-68	$C_{10.914}H_{21.832}$	153.1	6.47119	1394.72	204.260	40÷190	CLCD	>40	0.64	2	0.0426	2
Cylola (Isomeric mixture) ГОСТ 9410-71	$C_{7.99}H_{9.98}$	106.0	7.05479	1478.16	220.535	0÷50	CLCD	24	1.00	2	0.0672	2
Unit Alcohol ГОСТ 3134-52	$C_{10.5}H_{21.0}$	147.3	8.01130	2218.30	273.15	20÷80	CLCD	>33	0.70	2	0.0497	2
Oil transformer ГОСТ 10121-76	$C_{21.74}H_{42.28}S_{0.04}$	303.9	7.75932	2524.17	174.010	164÷343	CCL	>150	0.291	2	0.0312	2
Oil AMT-300TY 38-1 э 1-68	$C_{22.25}H_{33.48}S_{0.34}N_{0.07}$	312.9	6.99959	2240.001	167.85	170÷376	CCL	>170	0.35	2	0.0335	2
Oil AMT-300T TY38.101243-72	$C_{19.04}H_{24.58}S_{0.196}N_{0.04}$	260.3	6.49540	2023.77	164.09	171÷396	CCL	>170	0.43	2	0.0397	2

Table 2 (finished)

1	2	3	4	5	6	7	8	9	10	11	12	13
Dissolved solvent M (H-Butyl acetate 30 Etyl acetate- 5 Ethylene Alcohol 60 Isobutylene Alcohol- 5	$C_{2.761}H_{7.147}O_{1.187}$	59.4	8.93204	2083.566	267.735	0÷50	CLDC	6	2.79	2	2.0916	2
Dissolved solvent PM JI TY KY 467-56 (Toluene 10; Ethylal alcohol 64; Bytylen alcohol- 10; Ethyl cellosolve -16).	$C_{2.645}H_{5.810}O_{1.038}$	55.2	9.57161	2487.728	290.920	0÷50	CLDC	10	2.85	2	0.0970	2
Dissolved solvent PM JI -218 PMTY 6-10-729-68 (Butyl acetate-9; Ethyl acetate-16; Cylola-21; Toluene 21.5; Ethylene alcohol-16; Butylene alcohol-3; Ethyl cellosolve-13).	$C_{4.791}H_{8.318}O_{0.0971}$	81.5	8.07751	1761.043	251.546	0÷50	CLDC	4	1.72	2	0.0776	2
Dissolved solvent PM JI -135 TY6-10-1013-70 (Butyl acetate-18; Cylola-25; Toluene 25; Butylene alcohol 15; Ethyl cellosolve-17).	$C_{5.962}H_{9.799}O_{0.845}$	95.0	7.71160	1699.687	241.000	0÷50	CLDC	16	1.25	2	0.0704	2
Solvent P-4 (Butyl acetate -12); Toluene-68; Acetone 26).	$C_{5.452}H_{7.606}O_{0.535}$	81.7	7.17192	1373.667	242.828	-15÷100	CLDC	-9	1.60	2	0.0774	2
Solvent P-4 (Cylola-15; Toluene -70; acetone 15).	$C_{6.231}H_{7.798}O_{0.223}$	86.3	7.15373	1415.199	244.752	-15÷100	CLDC	-4	1.38	2	0.0756	2
Solvent P-5 (H.Butyl acetate-30; Celone -40; Acetone-30).	$C_{5.309}H_{8.655}O_{0.897}$	86.8	7.17850	1378.851	245.039	-15÷100	CLDC	-9	1.57	2	0.0725	2
Solvent P-12 (R.Butyl acetate-30; Cylola-10; Toluene-60).	$C_{6.839}H_{9.217}O_{0.515}$	99.6	7.04804	1403.079	221.483	0÷100	CLDC	10	1.26	2	0.0637	2

Quantity	Unit		
	Name	International	Russian
Base units of measuring system			
Length	meter	m	M
Weight	Kilogram	kg	kr
Time	Second	s	0
Electric Current	Ampere	A	A
Thermodynamic temperature	Kelvin	K	mo
Luminous intensity	Candela	cd	k
Plane angle	radian	rad	pag
Solid angle	steradian	S	ep

Derived units of measuring system with special name

Quantity	Unit			Representation through base and derived units of measuring system
	Name	Symbol		
		International	Russian	
Frequency	hertz	hz		C^{-1}
Force	Newton	N	S	
Pressure	Pascal	pa		
Energy	joule	J		
Power	Watt	W	BT	
Coulometric	Coulomb	C	k	
Voltages	Volt	V	B	
Capacitance	farad	P	ϕ	
Electric resistance	Ohm		CM	
Electric conductance	m0	S	CM	
Magnetic flux	weber	W	B	
Magnetic flux density	Tesla	T	T	
Inductance	Henry	H		
Luminous flux	Lumen	ln		
Luminance	lux	lx		
Absorbed dose of ion radiation 1- cm	Gray	Gy		
Dose equivalent of radiation	sievert			